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ON THE MOST DELICATE COLOR TEST FOR THE DETECTION OF STRYCHNIA.

By William T. Wenzell, of San Francisco, Cal.

Toxicologists seem greatly at variance as to the precise limit of sensibility of the color tests usually applied for the detection of strychnia. Among writers and authorities may be cited those who have designated limits beyond which the identification of the alkaloid, is regarded as doubtful; Wm. Copney places the test limit at 1-500,000th, G. T. Wormley 1-100,000th, Dr. De Vry 1-60,000th, Jordan 1-50,000th, all of whom recommend and use the test of bichromate of potassa and sulphuric acid. Wm. A. Guy uses a test liquid of a solution of 10 grs. of permanganate of potassa in one ounce of water, and is used in conjunction with sulphuric acid. He gives a stated limit of 1-12,000. Rodgers and Girtwood use a test which consists of 500 grains of sulphuric acid holding 1 grain of chromic acid in solution, which they esteem particularly useful for the detection of minute quantities of strychnia; but its limit of sensibility has not been stated.

The best form of using and manner of applying the color tests has also been a matter of opinion, but it is now generally believed that the application of the color test in the solid form is that which is to be preferred. The deserved superiority of using it in this form, although it is the best for the detection of quantities not exceeding the 1-100,000th of a grain of strychnia, in greater attenuations it seems incapable of inducing that characteristic development of colors which forms the means of positive

recognition of the alkaloid. The cause seems obvious. The proportions of the salt and acid used are always too great towards the quantity of strychnia tested if it exists in very minute proportions or traces. It is required to add to the acid previously dropped upon the suspected spot a fragment of a crystal of bichromate of potash, but if the alkaloid is minute, however small the crystal may appear, the oxidation will take place so rapidly as to either fail altogether in making an impression upon the optic nerve, or merely produce a momentary flash of blue without any subsequent play of colors, the absence of which cannot be received as sufficient evidence to prove the positive presence of strychnia. In testing for minute portions of the alkaloid it is a desideratum to use a reagent, the proportionate relations and superior sensitiveness of which will admit of the successful demonstration of traces of the poison. In experimenting towards that end I have found that a solution of one grain of permanganate of potassa in 2000 grs. of sulphuric acid is, *par excellence*, the test for that purpose. In delicacy of reaction, brilliancy of colors and duration, I have found it to be, in parallel experiments made with the bichromate of potassa and sulphuric acid test, greatly its superior.

While I do not claim priority of discovery of a valuable reagent in the use of the permanganate,—an honor which duly belongs to Wm. A. Guy, of London, and to whose valuable investigations on alkaloids and their tests I take pleasure in referring,*—I would simply state that I was not cognizant of its use as a test for alkaloids prior to the time when I first tried it; but becoming acquainted with that fact, I henceforth relinquished all claim. Believing it to be a valuable reagent, I determined to test its value. Considering a solution of the permanganate in sulphuric acid proper, and preferable to a solution in water, inasmuch as the water can act only as a diluent, and therefore must prove to some degree detrimental to the sensibility of the test. Further, a solution of the permanganate in water (10 grs. to ℥1) possesses a deep purple color, which might possibly be-

* On Color Tests of Strychnia and the Diagnosis of the Alkaloids. By William A. Guy, M.D. Cantab., vol. 2 and 3, pp. 558, 602. 11 and 12 Pharm. Journ. and Trans.

come a source of error, while on the other hand a solution of that salt in sulphuric acid (1 gr. to 2000 grs.) exhibits a light green color, which is less liable to be confounded with the colors developed during the application of the test.

The test solution of strychnia was made with the crystallized alkaloid dissolved by the intervention of sulphuric acid in water; each drop of the solution representing the $\frac{1}{50000}$ of a grain of the alkaloid. A pipette was used capable of dropping one-sixth of a drop. The drop here alluded to was carefully ascertained to be equal to 1·2 minim. So that the pipette drop was equal to 0·2 minim. The dilutions were prepared from this normal solution. The following table will exhibit the different strychniated solutions prepared for experiment, with amounts of strychnia contained in each $\frac{1}{6}$th drop, and the comparative results obtained by the application of the different test agents employed:

Amt. of strychnia contained in $\frac{1}{6}$ drop of each solution.	$KO,2CrO^3$ & SO^4H test (solid).	CrO^3 and SO^4H test (1——500).	KO,Mn^2O_7 and SO^4H test (1——2000).
$\frac{3}{6}$ drop $\frac{6}{3}$ x 50,000 = 1-100,000.	Color reaction distinct and well defined.	Color reaction very fine and distinct.	Reaction very brilliant and durable.
$\frac{1}{6}$ drop $\frac{6}{1}$ x 50,000 = 1-300,000.	Reaction weak and evanescent.	Colors fine and distinct.	Colors brilliant and reaction distinct.
$\frac{1}{6}$ drop $\frac{12}{1}$ 50,000 = 1-600,000.	No reaction.	Colors still definable, but weak.	Reaction distinct and colors fine.
$\frac{1}{6}$ drop $\frac{18}{1}$ 50,000 = 1-900,000.		No reaction.	Reaction faint, but succession of colors well defined.
$\frac{1}{6}$ drop $\frac{24}{1}$ 50,000 = 1-1,200,000.			Reaction very faint.

It will be seen on inspecting the above table that the limit of positive recognition by the bichromate of potassa and sulphuric acid test may be placed at $\frac{1}{100000}$, that of the chromic acid, &c., test, at $\frac{1}{600000}$, and that of the permanganate at $\frac{1}{900000}$. The manner in which the experiments were conducted may be stated as follows:

The one-sixth of a drop of the normal solution was dropped from the pipette upon a warmed, highly glazed porcelain surface, and allowed to evaporate spontaneously. The thin circular film which the drop left was readily perceived by the aid of a good light. It was found that the alkaloid contained in the

drop tends on evaporation to crystallize principally near the edges of the drop, thus forming the margin, which constitutes the circular outline of the film. It is therefore the margin of the evaporated drop that will furnish the most decided evidence of the presence of the alkaloid. By means of a blunt-pointed glass rod, the point of which having been slightly moistened with sulphuric acid, a small drop was placed upon the margin of the film, and in using the bichromate test, a most minute crystal of that salt was placed upon or pushed into the drop of acid, and by means of a glass rod the crystal, together with the acid, was drawn around the margin of the film. This mode of procedure with this test, although very delicate, will fail to detect the strychnia positively in this fractional drop. By superimposing and evaporating successively three $\frac{1}{6}$ drops, the reaction is then rendered quite positive.

In testing with the liquid reagents the sulphuric acid must be added in extremely minute quantities. A mere dot placed upon the margin of the film must be regarded as sufficient, and its effect upon the deposit carefully observed. Then by means of a small pipette, the point of which is drawn to a capillary bore and charged with the reagent, a minute drop of it is allowed to flow upon the dot of acid, when by means of a pointed glass rod drawn around the margin of the spot, the colors created by the reagent are obtained with various degrees of vividness and duration, according to the amount of alkaloid contained in the deposit, and the permanganate test will positively indicate the 1-900,000th of the alkaloid. I have successfully concentrated a $\frac{1}{6}$ drop by placing the porcelain plate obliquely while the droplet is evaporating; the drop will gradually contract on the glazed surface to about one-third of the space it would have otherwise occupied, and thus serve to insure more positive results. Scrupulous accuracy and cleanliness should be observed in conducting these microchemical manipulations. The reagent ought to be freshly prepared from pure materials, of proper strength, and used quantitatively with the greatest care.

Philadelphia, August 28, 1870.

PHOSPHATE OF LIME IN ACETIC ACID.

To the Editor of the American Journal of Pharmacy:

Sir,—Not long since, I had occasion to determine in a sample of undried Charleston, S. C., guano the amount of phosphoric acid, and being out of chemically pure acetic acid, I requested my assistant to procure for me a small quantity at No. , this city. Although the figures of the first and second determinations corresponded, they were unsatisfactory; those of the third, fourth, and fifth determinations, differing largely among themselves, were equally unsatisfactory. Here follow the percentages: Nos. 1 and 2, 28·69 per cent.; No. 3, 26·75 per cent.; No. 4, 33·42 per cent.; No. 5, 30·22 per cent.

As the method used by me gives, when properly executed, very concordant results, it was thought advisable to test the *chemically pure* (*!*) acetic acid. Ammonia in excess was added, when a *copious*, *white*, *gelatinous precipitate* formed, which, on investigation, proved to be *phosphate of lime*. (The ammonia filtrate I omitted to examine. I doubt not that it contained lime originally combined with carbonic acid.) It is easy now to account for the high percentages of phosphoric acid, and to explain the discrepancies the following is offered:

The hydrochloric or nitric acid solution of the guano (prepared in a proper manner), to which a known quantity of citric acid has been added, is supersaturated with ammonia, the precipitated bone-phosphate of lime dissolved in an excess of acetic acid, and the lime eliminated by means of oxalate of ammonia. Now, according as the excess of ammonia is large or small, the result will be influenced, not only by the amount of acid required to saturate an excess, large or small, but by the excess of acid as well; and, had not the quantity (1 gramme) of substance used for analysis been the same in each case, it would be natural to seek a cause here; for it is evident the smaller the amount of substance taken, the higher the percentage of phosphoric acid, and *vice versâ*.

When *pure* acetic acid was used, the sample of Charleston, S. C., guano yielded of phosphoric acid 22·36 per cent.

The writer regrets that he is unable to give the percentage of

phosphoric acid and lime contained in the acid, he having exhausted his stock in the foregoing experiments, and, on procuring some more, *at the same place*, it was *free* from impurity.

In conclusion, it remains to ask, Whence came the phosphate of lime? Supposing that it was intended to convert, *with little trouble*, an *inferior* acid into a *superior* one, would it be assuming too much to say that *bone-black* was the medium?

Respectfully,

WM. H. BRUCKNER, Ph. D.

Chemical Laboratory, No. 138 *Walnut street,*
Philadelphia, Aug. 11, 1870.

NOTE ON ADULTERATED SAFFRON.

By John M. Maisch.

Pharmaceutical literature has, on frequent occasions, noticed various adulterations of saffron. The old clumsy method of mixing saffron with the florets of *Carthamus tinctorius*, or with the dyed florets of *Calendula officinalis*, or with the cut petals of various flowers, seems to be discarded now, and new methods, among them some very ingenious ones, are now practiced. It is not very difficult to find excellent saffron in the American market, though inferior kinds, partly exhausted and well oiled, are by no means uncommon.

I have lately received some saffron very handsome in appearance, of good and strong odor, and yielding a deeply colored tincture. Some yellow filaments were intermixed, which proved to be partly the styles, but mainly the stamens with the anthers attached. This last named intermixture naturally led to the conclusion, that the orange red powder which was found distributed through the saffron, consisted of pollen. A number of small lumps were observed, somewhat glutinous to the touch, and consisting of a few styles, some other filamentous substance and the pollen-like powder. To determine the nature of the unrecognized filaments, a few lumps were thrown into water, when they were found to be stamens and anthers. In this experiment, the water had become so slightly tinged, and the supposed pollen settled so readily and in such a peculiar manner, that

suspicion was aroused as to its identity. Under the microscope it did not show the structure of pollen; treated with dilute muriatic acid it dissolved readily, with strong effervescence, and the solution, supersaturated with ammonia, produced with oxalate of ammonia a white precipitate. The powder consisted of prepared chalk, colored by saffron and treated with glucose or honey to improve its pollen-like appearance, the aqueous infusion of the powder giving abundant evidence of the presence of sugar. The proportion of this adulteration is estimated at about 10 per cent. of the entire weight.

A similar adulteration of saffron, which occurred in Germany, is noticed on page 218 of this volume, the adulterant being gypsum, used to the amount of 12 per cent. The employment of chalk for this purpose I consider as quite an *improvement* on the former.

The adulteration was doubtless made in Europe; the saffron was obtained from a first class house, but had passed already through two hands. The saffron being otherwise good, the fraud is very likely to deceive, and a close scrutiny is advisable whenever *pollen* is apparently adhering to saffron.

P. S.—After the above was in type, I received through a friend two samples from the New York market, one of which was pure saffron, but collected with the entire styles, so that it was a mixture of about one part yellow and three parts saffron colored filaments; the other sample consisted of some true saffron, but was mainly composed of the florets of Carthamus partly broken up, and the florets of Calendula dyed red, and rolled up, to resemble saffron somewhat. It seems, therefore, that what I have above called a clumsy method of adulterating saffron, is still practised,—the product being likely to satisfy the careless, and those who invariably buy *cheap* drugs.

NOTE ON MISTURA CRETÆ.

Editor Am. Journ. of Pharmacy:

Dear Sir:—Allow me to recommend to your readers the following formula for Mistura Cretæ, which yields a preparation that does not ferment in the warmest weather and always gives satisfaction.

℞ Cretæ Præp.
Pulv. Gum. Acac.
Glycerinæ (pure) aa ℥i
Aquæ Cinnamomi, ℥xv

Mix in the usual manner.

In the revision of our national standard I hope to see glycerin substituted for syrup and sugar in very many officinal preparations, believing it will in almost every instance be an improvement. Glycerin preparations made by cold percolation direct from the crude drugs may advantageously take the place of nearly all the present officinal syrups, possessing, if desired, the same density, better representing their respective bases, and of far more stable character. Of this I am satisfied from actual experiment.

I would respectfully suggest to Mr. Herman Koch an improvement in his method of making suppositories, i. e., to substitute tin-foil for paper in forming the moulds. I have found it much to be preferred. Respectfully,

H. P. Reynolds.

Plainfield, N. J., July 8th, 1870.

ADDITIONAL NOTE ON TINCTURE OF NUX VOMICA.

To the Editor:

Dear Sir:—In answer to your question appended to my note on Tinct. Nux Vomica in the last Journal,* I will state that I examined the small amount I had left for potassa and soda and found it to contain neither, using the blow-pipe test, which produced neither a purplish nor yellow color in the outer flame of the pipe; the purplish color would have showed the presence of potassa and the yellow soda. As the above tests sometimes fail in detecting these two alkaloids, I used other tests, and could find neither soda or potassa. I next examined it for ammonia, and the result here proved the presence of that alkali. Tests used were adding carb. soda, and heating; the odor of ammonia produced was quite strong. I next brought the vapor in con-

* See page 229 of July number.

tact with vapors from muriatic acid, and the white cloud-like appearance was formed. The vapor also restored litmus paper to its blue color, after being reddened by nitric acid. This proved at once that the alkalinity of the nux vomica was due to ammonia, and not to strychnia, as I thought. But the crystals formed in the bottle were strychnia with a small amount of brucia, as I have stated before, and no doubt were displaced by the ammonia. Yours respectfully,

GEO. W. KENNEDY.

Pottsville, July 18, 1870.

ON CHALK MIXTURE.

BY W. RANSTEAD JONES.

Editor Amer. Journ. Pharmacy:

Dear Sir,—On several occasions I have found chalk mixture, prepared as directed by the U. S. D., to turn sour, if made for a few days. To avoid this I have pursued the following plan, with satisfaction. I prepare a powder of

Prepared Chalk, ℥ss.
P. Sacch. Alb.,
P. G. Acacia, *aa* ʒij.

Mix well by rubbing in a mortar, and keep well stopped from the air in a bottle. Where the chalk mixture is required, take ʒj of the powder to f℥ss each of water and cinnamon water for each f℥ of chalk mixture required.

Mt. Airy, Phila., Aug. 11, 1870.

TINCTURA CINCHONÆ COMPOSITA.

To the Editor:

As the time is fast drawing near when our Pharmacopœia will be revised, I thought it would not be out of place to make a suggestion in reference to the U. S. P. formula for Tinct. Cinch. Comp. The composition of it, as we are all aware, is red cinchona bark, bitter orange peel, Virg. snake root, saffron and red saunders. What I want to call attention to is the red saunders. Why is it used in the preparation for no other purpose than to give the tincture a dark red color? Now we have color-

ing matter enough in the other drugs that are used to make the tincture a dark red color. I do not use any saunders in making this tincture, and always have a beautiful dark preparation, and prefer it to our officinal formula. I believe the committee on revision would do well to drop it from the tincture altogether, as there are no real medicinal properties in the drug; and where is the use of pouring dye stuffs into the stomach and no benefit to be derived from them? Yours respectfully,

GEO. W. KENNEDY.

Pottsville, Pa., July 21, 1870.

GLEANINGS FROM GERMAN JOURNALS.

BY DR. FREDERICK HOFFMANN, of New York.

Contributions to the Knowledge of the Opium Alkaloïds.

O. Hesse, well known by his elaborate researches on the cinchona alkaloïds, has published in the Annal. der Chem. & Pharm. vol. 153, p. 47, the results of a series of researches on some of the alkaloïds of opium, especially on meconidine, laudanine, codamine, thebaïcine and papaverine. The following is a brief résumé of the author's paper:

Meconidine—$C_{20}H_{23}NO_4$—forms a yellowish-brown, diaphanic, amorphous mass which melts at 58° C.; it is readily soluble in alcohol, ether, chloroform, benzene and acetone; its alcoholic solution blues red litmus paper and neutralizes acids. Being insoluble in water, it has no taste; its acidified solution, however, tastes bitter. Strong sulphuric acid dissolves meconidine with olive-green, strong nitric acid with orange-red color. Meconidine as well as its salts are unstable, and their solutions readily decompose, especially when they contain acids.

Laudanine—$C_{20}H_{25}NO_3$—crystallizes in small anhydrous colorless prisms; it melts at 165° C., and on cooling congeals in crystals; it is readily soluble in benzene, chloroform and boiling alcohol, but little in cold alcohol and in not less than 540 parts of ether; its solutions are bitter. With ferric chloride they form a deep green precipitate. Strong nitric acid dissolves laudanine with orange-red color, strong sulphuric acid with rose color; on warming, the latter solution turns dark purple.

Codamine—$C_{19}H_{23}NO_3$—forms large colorless prisms, readily soluble in boiling water, in alcohol, ether, chloroform and benzene; its solutions blue red litmus paper and neutralize acids, forming salts of a very bitter taste, all of which are apparently amorphous. Codamine melts at 121° C., and congeals on cooling. With strong nitric acid it forms a dark green solution, which after a while turns brighter; with strong sulphuric acid it forms a blue solution.

Lanthopine—$C_{23}H_{25}NO_4$—forms a white tasteless crystallinic powder, soluble in chloroform, but very little in alcohol, ether and benzene; with strong nitric acid it forms a dark red resin, which gradually dissolves in the acid; strong sulphuric acid dissolves lanthopine with purple color. Its salts crystallize, and their solutions are liable to deposit precipitates in a gelatinous condition.

Thebaïne—$C_{19}H_{21}NO_3$, $C_4H_6O_6+H_2O$—crystallizes in beautiful colorless crystals, much like benzoic acid, and also in solid prisms. It melts at 193° C., and on cooling recrystallizes. Thebaïne is readily soluble in alcohol, benzene and chloroform, but nearly insoluble in cold water; 140 parts ether are required to dissolve 1 part of thebaïne; its solutions are tasteless; its alcoholic solution blues red litmus paper, and neutralizes sulphuric acid. Strong nitric and sulphuric acids decompose thebaïne, the latter producing a deep pink solution, which, when diluted with water, forms, on addition of ammonia, a white amorphous precipitate, which successively turns blue, green, red and brown; if, however, diluted sulphuric acid had been used for the solution of the alkaloid, the sulphates of thebaïne and thebaïcine are formed without change of color.

Thebenine forms a white, flocky precipitate, little soluble in boiling alcohol and ammonia, insoluble in ether and benzene, but freely soluble in potassium hydrate solution; it neutralizes hydrochloric and sulphuric acids, and forms with the latter a beautiful blue solution, which discolors on dilution with water, but which restores the dark color on further addition of strong sulphuric acid. The chlorhydrate of thebenine is to all appearance no poison, whilst the analogous thebaïne is one of the most powerful poisons.

Thebaïcine is readily soluble in potassium hydrate solution, very little in boiling alcohol, and insoluble in ether, benzene, water and ammonia. With strong nitric acid it forms a dark pink solution; with strong sulphuric acid, a dark blue one. The author thinks thebaïcine very likely to be isomerous with thebaïne.

Papaverine—$C_{21}H_{21}NO_4$—crystallizes in colorless tender prisms; it is readily soluble in warm alcohol, in chloroform, benzene and in acetone, very little in cold alcohol and ether; its solutions do not act upon red litmus paper. Strong sulphuric acid dissolves papaverine colorless; acetic acid dissolves it without being neutralized.

Hesse prepared, examined and analyzed a number of papaverine salts.

At the conclusion of his elaborate paper O. Hesse points out some of the general results of his studies on the opium alkaloids. In order to form a correct idea on the comparative small quantities of these alkaloids in opium he states, for instance, that a Turkey opium which contained 8·3 per cent. morphine, contained only 0·0058 per cent. lanthopine, 0·0052 per cent. laudamine, and 0·0033 per cent. codamine.

Codamine and laudamine belong, with the more important opium alkaloids, to an homologous series, whose members differ successively by the radical X CH_2. This series is at present:

Morphine, . . = $C_{17}H_{19}NO_3$.
Codeïne, . . . = $C_{18}H_{21}NO_3$.
Codamine, . . = $C_{19}H_{23}NO_3$.
Laudamine, . . = $C_{20}H_{25}NO_3$.

Collateral members to this series are until at present:

Pseudomorphine, . . = $C_{17}H_{19}NO_4$.
Apomorphine, . . = $C_{17}H_{19}NO_2$.

A second series of homologous opium alkaloids are:

Papaverine, . . = $C_{21}H_{21}NO_4$.
Lanthopine, . . = $C_{23}H_{25}NO_4$.
Cryptopine, . . = $C_{23}H_{25}NO_5$.

and probably

Narceïne, . . . = $C_{23}H_{29}NO_9$.
Rhœadine, . .
Rhœagenine, . . } = $C_{21}H_{21}NO_9$.

Rhœagenine, whose salts are analogous to the corresponding salts of papaverine, may accordingly be viewed as dioxypapaverine, and cryptopine as oxylanthopine:

$$\text{Papaverine, } C_{21}H_{21}NO_4+O_2 = C_{21}H_{21}NO_6 \text{ Rhœagenine.}$$
$$\text{Lanthopine, } C_{23}H_{25}NO_4+O = C_{23}H_{25}NO_5 \text{ Cryptopine.}$$

An intermediate alkaloïd between papaverine and lanthopine has as yet not been found in opium, very likely because in the processes of vegetable life it may readily be transmuted into narcotine—$C_{22}H_{23}NO_7$; the formula of such an alkaloïd ought to be $C_{22}H_{23}NO_4$.

Whether meconidine is closely related to the papaverine series or to papaverine itself is not evident, neither from its formula nor from its deportment; it contains two equiv. H more than papaverine; perhaps both alkaloïds are forms of successive transmutations of the vital processes within the plant.

It may here opportunely be remembered that meconidine is homologous to the alkaloid of another Papaveracea, to sanguinarin—$C_{18}H_{17}NO_4$, which is said to be identical with chelerythrine, the alkaloïd of chelidonium majus.

Contributions to the Knowledge of the Aconitine Alkaloids.—Flückiger, in a paper on the alkaloids of the aconite tubers, arrived at the following conclusions:

1. Aconitine is contained in the European aconites with blue flowers, especially in *Aconitum Napellus*, L.; it is also contained in similar species of the *Himalaya*, which are known under the name of Bikh, and among which is also *Aconitum Napellus*. *Aconitum Lycoctonum*, L. (with yellow flowers), according to Hübschmann's researches, is void of aconitine.

2. Aconitine has the following properties: It softens in boiling water, and colors concentrated hot phosphoric acid purple, which color is retained, when cool, for several days. The watery solution of aconitine tastes bitter, not acrid; it is not precipitated by platinic chloride solution, but gives a voluminous amorphous precipitate with potassium iodo-hydrargyrate. Aconitine dissolves readily in ether, alcohol and chloroform; it is anhydrous, melts near 120° C., *not* at 80° C.; it forms a monochlor-

hydrate. The aconitine nitrate crystallizes in well-defined crystals; the alkaloid forms only exceedingly small and indistinct crystalline masses.

3. All samples of aconitine from England which the author examined corresponded in their above deportment with German aconitine, except one sample from Hopkin & Williams, which beside being bitter was very acrid; therefore Dr. Flückiger thinks that English and German aconitine at present are identical.*

4. There is an alkaloid entirely different from aconitine, and of uncertain derivation, perhaps from aconite tubers (Bikh) from Nepal and the slopes of the Himalaya. Flückiger terms this alkaloid pseudaconitine; Schroff called it English or Morson's aconitine; Wiggers proposed the name Napellin; Flückiger called it previously Nepalin; Ludwig, acrakonitine.

Pseudaconitine does not soften in boiling water, tastes acrid, not bitter, and does not color concentrated hot phosphoric acid; it is insoluble in water, little in alcohol, ether and chloroform, but crystallizes from its hot saturated solution in large prisms. —*Pharmac. Centralhalle*, 1870, 24.

Iodoform as a Means to Detect Alcohol.—A. Lieben, in the Annal. der Chem. & Pharm. 1870, Suppl. Bd. vii, 2, describes a method of detecting ethyl alcohol by the formation of iodoform. In the simple case when the presence of alcohol in a watery solution has to be determined, the sample is warmed in a test tube, a few drops of an iodinized potassium iodide solution are added, and afterwards a few drops of potassium hydrate solution. If the quantity of alcohol is not too small, a turbidity results by the formation of microscopically small yellow crystals of iodoform.

Hager finds this reaction very accurate, and states that it detects alcohol in liquids containing but 1-2000th after about one day's standing. The crystals are remarkable and beautiful by the variety of their star-shaped arrangement. Hager suggests the following *modus operandi:* The reagents used are a solution

* The variations of commercial aconitine, as stated by Merk's and Hübschmann's researches, are given in my Report on Progress of Pharmacy to the Amer. Pharm. Assoc. in the Proceedings of 1869, p. 263.

of potassium iodide in 5—6 times its weight distilled water and oversaturated with free iodine and a solution of potassium hydrate of about 10 per cent. strength. To the liquid to be examined 5—6 drops of the latter solution are added. After warming to about 50° C. so much of the potassium iodide solution is added drop by drop that its color, after gentle agitation, remains yellowish-brown; then the liquid is carefully discolored by the addition of a few drops of the potassium hydrate solution. When set aside the iodoform crystals deposit, and are recognized under the microscope.

The process is obvious; it is effected not alone by ethyl alcohol, but by a number of different substances, among which are aldehyde, acetone, gummi, sugar, lactic acid, methyl alcohol, propyl alcohol, and many volatile oils. The formation of iodoform is *not* produced by amyl alcohol, ether, ethyl chloride, chloroform, chloral hydrate, glycerin, phenol, and by acetic, benzoic, butyric, citric, formic, oxalic, succinic, valerianic and tartaric acids.

Detection of Alcohol in Chloroform and Chloral Hydrate.

This test is, according to Hager, superior to any for the detection of alcohol in chloroform and chloral hydrate:

Chloroform.—To determine the presence of alcohol in chloroform 2 vol. chloroform are mixed with 5 to 10 vols. of water, of about 50° C. The liquid, after some shaking, is poured on a filter previously completely saturated with water. The filtrate is then examined as described above. After 12—24 hours depositing the sediment is examined under the microscope.

Chloral Hydrate.—Chloral forms with ethyl alcohol chloral alcoholate, corresponding to chloral hydrate in its chemical and physiological properties. Since the equivalent weight of ethyl alcohol is five times greater than that of water, it is of considerable pecuniary advantage to the manufacturer to bring the chloral alcoholate into the market instead of the hydrate; besides the former crystallizes finer and more solid.

The examination is made with a solution of the sample in distilled water, in the above given mode. When discoloring the iodinized liquid, each drop of the potassium hydrate solution

produces turbidity, which, however, disappears on gentle agitation. If the sample contains alcoholate, the liquid remains more or less turbid, or deposits iodoform crystals after a time, although this is partly soluble in the presence of chloral. Of some commercial samples examined by Hager, Schering's chloral hydrate was the only one entirely free from alcoholate.—*Pharm. Centr. H.* 1870, No. 18.

More recently Schering calls attention to some more distinctions between chloral hydrate and chloral coholate; when warmed in a test tube in twice their bulk of water, the hydrate, as known, dissolves readily, but the alcoholate melts without solution, and, on cooling, congeals under the water. Sulphuric acid, when warmed with chloral hydrate, remains colorless, whilst it turns brown with the alcoholate. When warmed in nitric acid of 1·2 spec. gr., chloral hydrate gives none or but a very slight reaction, whilst with the alcoholate a vehement reaction ensues under evolution of nitrous oxid gas.—*Pharm. Centr. H.*, 1870, *No.* 26.

Examination of Commercial Sulphuric and Hydrochloric Acids for Arsenic.

Sulphuric Acid.—In a test tube, of medium size, about 5 grains of stannous chloride are dissolved in 4—6 c. c. pure hydrochloric acid, of about 25 per cent. strength. To this solution 2—3 c. c. of the sample of the sulphuric acid are added, drop by drop, and with frequent gentle agitation; the mixture evolves considerable heat. If a white precipitate be formed, a few drops hydrochloric acid are added in order to dissolve it. When the sample is free from arsenic, the liquid remains clear for quite a time; but if arsenic is present it becomes yellow, and turns gradually dark brown and turbid, and after some hours grayish-brown arsenic deposits in flocks.

Hydrochloric Acid.—The mode of examination is the same, but instead of the pure hydrochloric acid the sample to be examined is used, and instead of the sulphuric acid the monohydrate of pure sulphuric acid.—*Pharm. Cent. H.* 1870.

Suggestion to Preserve Medicines liable to Deterioration.—Aqueous tincture of rhubarb is a popular remedy with German

physicians. It is prepared, according to the Prussian pharmacopœia, by maceration of 12 parts rhubarb in slices, 3 parts carbonate of potassa and 16 parts of spirituous cinnamon water. After 12 hours the pulp is expressed and the liquid filtered. This preparation is very liable to deterioration, and its preservation has been a constant subject of suggestions. Recently C. Baumann applied to its preservation a method which in this case was very successful, and which perhaps merits consideration. Baumann evaporated the tincture to a syrupy consistency, and absorbed this by a weighed quantity of previously washed, levigated and dried quartz sand, and exsiccated the whole at a gentle heat. By weighing the dry mass, the proper proportion and the quantity corresponding to each ounce of the tincture may easily be ascertained. 800 parts tincture and 310 parts sand give 400 parts dry residue. From this the tincture can readily be extracted by stirring the required weight with the corresponding quantity of water, and by decantation or filtration if necessary.—*Pharm. Cent. H.* 1870, *No.* 19.

GLEANINGS FROM GERMAN JOURNALS.

By John M. Maisch.

Cinchona barks from Java.—Of the first 9 bales of cinchona barks received a few months ago from Java, by the Dutch government, Julius Jobst has received four samples, which had been assayed by Prof. Gunning, of Amsterdam, and subsequently by Jobst, with the following results. The marks are those of the Dutch "maatschappy":

No. I. T. P. Java Royal Cinchona.—Alkaloids: 3·5 per cent. soluble in ether (much quinidia), 2·0 per cent. insoluble in ether. G.—3·2 per cent. alkaloids: much quinidia and cinchonia, trace of quinia, no cinchonidia;* an amorphous base, the examination of which is promised. J.

Nos. II & III. T. P. Java Royal Cinchona.—Alkaloids: 2·1 per cent. soluble (with little quinidia), 1·3 per cent. insoluble in ether. G.—3·5 per cent. alkaloids, with 1·7 quinia = 2·3 sul-

* Conchinin of Jobst's paper = quinidia, and chinidin = cinchonidia of Pasteur.—J. M. M.

phate, little cinchonidia, quinidia, cinchonia and amorphous base. J.

No. IV. M. Java Royal Cinchona.—Alkaloids 1·5 per cent. soluble (with little quinidia), 1·0 per cent. insoluble in ether. G.—1·9 per cent. alkaloids with 0·5 per cent. quinia = 0·7 sulphate, cinchonia, some cinchonidia, quinidia and amorphous base. J.

T. P. Brown Java Cinchona.—Alkaloids: 1·1 per cent. soluble, 0·9 per cent. insoluble in ether. G.—1·2 per cent. alkaloids, mostly cinchonidia and amorphous base, trace of quinia; neither cinchonia nor quinidia. J.

The latter is undoubtedly Pahudiana bark. The propagation of the plants yielding it has been prohibited by the Dutch government. Nos. II & III approximate bad Calisaya bark, as at present frequently met with. The present Java cinchona barks are not yet adapted to the manufacture of quinia, though they may be used in place of the grey and brown Huanuco and Loxa barks, which at present are rather scarce. The price of the Java cinchonas is 3 guilders ($1.20 gold), per kilo.—*Buchner's N. Repert.* 1870, 341–345.

Behavior of ferroso-ferric oxide to saline solutions.—Dr. J. B. Schober observed that this oxide has the property of absorbing certain salts from their dilute aqueous solutions, and fixing them in such a way that they cannot be removed by washing. This is the case with the nitrates of lead, silver, copper and nickel, the sulphates of copper, iron and zinc, stannic chloride, &c., also organic matter. Alum, chromic alum and tartar emetic are decomposed, the salt of the alkali remaining in solution. Baryta salts are with difficulty absorbed, still more difficult the lime and strontia salts. Corrosive sublimate, magnesia and alkali salts are not absorbed. Oxide of iron appears to have similar properties, but in a less degree.—*Ibid.* 345–348.

Tin foil containing lead to the amount of from 1 to 19 per ct. is often met with. Aug. Vogel found that soap, chocolate and dry candies wrapped into such foil for some time, are not contaminated with lead, but cheese, under similar circumstances, always contained lead in and near the rind, in small proportion. —*Ibid.* 348–351.

Rhinanthin.—Prof. H. Ludwig has had occasion to examine some rye bread, of a violet black color, also the grain from which the flour had been made. The latter contained 97·5 per ct. of the fruit of cereals, nearly all rye, the balance being seeds of weeds, &c., among them 1·415 parts from *Rhinanthus alectorolophus*, Lin. (*Alect. hirsutus*, Reichenbach), to the presence of which the color of the bread was due, and from which the chromogen was obtained. The crushed seeds were exhausted with boiling alcohol, the solvent evaporated, the oil removed by ether, and the filtered aqueous solution evaporated to a syrupy consistence, from which rhinanthin crystallizes in stellate prisms, which are to be purified by recrystallization from alcohol. Its aqueous solution is not affected by chlorine, salts of iron, lead, copper and silver (in the cold), but is colored brown by mineral acids. Its alcoholic solution heated with muriatic acid yields a green blue coloration of such intensity that the liquid is nearly black in appearance. It has a bitterish sweet taste and is soluble in water and alcohol. Its composition is $C_{58}H_{52}O_{40}$. Boiled with dilute muriatic acid, it yielded 13·9, and in another experiment 26·7 per cent. of dark brown floccules, rhinanthogenin; composition, $C_{34}H_{20}O_{8}$. The filtrate contained a fermentable sugar, of the composition $C_{12}H_{18}O_{18}$. The relation of the brown product to the intensely blue body, obtained by alcohol and muriatic or sulphuric acid, was not established.—*Archiv d. Pharm.* 1870, *June*, 199–215.

The tannin of the European alder, Alnus glutinosa, has been examined by F. Dreykorn and E. Reichardt, who found that with sulphuric acid it splits into alnic red and sugar; fused with hydrate of potassa, phloroglycin, protocatechuic and acetic acids are formed; on dry distillation, pyrocatechin is obtained.—*Ibid.* 215–232.

Preparation of tannin.—Oscar Rothe proposes the following process, which he has found well adapted to Chinese galls: 8 parts powdered galls are macerated with 12 p. ether and 3 p. strong alcohol for two days, the liquid decanted, the residue treated with the same solvents and expressed. The liquid is decanted from the sediment, mixed with 12 p. water, the alcohol and ether recovered by distillation, the aqueous solution rapidly

filtered and quickly evaporated in a steambath, the residue dried and powdered.—*Ibid*, 232, 233.

Paricina was discovered by Winkler in 1845. Weidenbusch's analysis gave results nearly agreeing with the composition of aricina, which induced Gerhardt to regard it as amorphous aricina. Winkler observed (1865) that, like bebirina, its solutions are precipitated by nitric acid, and that the two otherwise agree in their chemical behavior. Flückiger (1869) assumes the identity of the two (with buxina or pelosina) and suggests that paricina might be obtained from all cinchona barks, being probably contained in the precipitate occasioned by iodide of potassium. O. Hesse has during the last eight years often attempted to obtain paricina from the mother-liquors of quinia, by mixing them with concentrated nitric acid, but always without success. He also directs attention to the statement of Flückiger that pelosina turns polarized light to the right, while paricina is without effect upon it (De Vry), and argues that paricina must still be regarded as a distinct cinchona alkaloid.—*Ibid.* 235–237, *from Ber. d. Deutschen Chem. Gesellsch. zu Berlin*, 1870, *May*, 232.

Yield of extracts.—E. Schwabe has obtained the following amount of extract from best Smyrna opium: 44·44, 37·50, 54·15 per ct. From socotrine aloes the author obtained by the process of the Prussian pharmacopœia (cold water) 31·25 and 12·5 per ct. extract, from hepatic aloes 48 per ct., and from Cape aloes 16·6 per ct.—*Ibid.* 241, 242.

Balsam of Peru.—E. Schwabe states that when 1 grm. pure balsam of Peru is triturated in a mortar with 5 drops concentrated sulphuric acid, cinnamein is converted into resin, and the balsam assumes the consistence of a pilular mass, of a grey brown color. Adulterations with castor oil or copaiva balsam are shown by the soft consistence of this mass.—*Ibid*, 242, 243.

Conia in hemlock fruit.—Prof. V. Schroff arrives at the following conclusions from his experiments: 1. The unripe fruit of *Conium maculatum* of the first year's growth contains the least quantity of conia. 2. The largest proportion is found in the well developed unripe fruit of plants of the second year's growth, just previous to ripening. 3. The ripe fruits, occurring only on the second year's plants, are intermediate in the amount

of conia between the unripe fruits from first and second years' plants.—*Ibid.* 261, *from Wien. arztl. Wochenbl.* 1870, 1.

PURIFICATION OF CHLORAL HYDRATE.

By Dr. F. A. Flückiger.

The author refers to Rieckher's and Hager's observations,* regarding reliable tests for the purity of this medicinal agent, but he objects to its employment unless it be in well formed separate crystals. Though as met with in commerce it is usually of good quality, the crystalline masses or imperfect fractions of crystals are unsightly in appearance and frequently possess a stinging odor, and readily absorb moisture; qualities which are due to its insufficient purification on a large scale. The last traces of impurity cannot be removed by fusing and redistilling it, and its appearance is not improved by this operation. This purpose is effected solely by recrystallization.

There is perhaps scarcely a liquid in which chloral hydrate is insoluble at ordinary temperature; four parts of it dissolve gradually in one part of water, the solution crystallizes at 0° C., but not in well formed crystals. Alcohol and ether dissolve it to such an extent that it likewise does not crystallize well on evaporating these solvents; absolute alcohol must be excluded because it combines with chloral.†

Chloroform and benzole are well adapted for recrystallization, but the first is too dear and the last cannot be entirely removed from the crystals. The same holds good for oil of turpentine, from which most beautiful tables and laminæ are obtained, if 1 p. chloral hydrate is dissolved in from five to six parts of the oil at from 30 to 40° C., and the solution allowed to cool slowly. Fat oils, which dissolve it readily, are evidently not adapted for this purpose. From petroleum ether, which at a moderate heat dissolves much chloral hydrate, it crystallizes well on cooling, but too rapidly to admit of large prisms being obtained; on a large scale, however, it may be of better service.

Uniformly satisfactory results were obtained with bisulphide of carbon. 45 parts of it dissolve at 15 to 18° C. but 1 p. choral hydrate; it precipitates ethereal and alcoholic solutions of the

* Amer. Jour. Pharm., 1870, p. 238. † L. c. p., 239.

latter. But at temperatures below the boiling of bisulphide of carbon, 4 to 5 p. of it are sufficient for dissolving 1 p. chloral hydrate. If allowed to cool slowly, beautiful crystals often an inch in length are obtained, easily collected, and readily freed from the last traces of the solvent by exposing them in thin layers to the air. Thus obtained, chloral hydrate possesses no acid reaction and does not attract moisture. The best prisms begin to fuse at 49° C., larger quantities at 53 to 54° C., the fused mass congealing again at 34°, or at 40° C. if a few crystals had remained unfused. Samples not well crystallized fuse at a lower temperature. The boiling point is 97·5° C. if the entire thermometer is surrounded by the vapors.

Bisulphide of carbon is cheap. Some loss is unavoidable; impurities in the mother-liquor increase gradually to such an extent that a rectification of the bisulphide over corrosive sublimate becomes necessary. With the last portions of the solvent a little chloral hydrate evaporates from the crystals, but the loss from that source is insignificant, ½ grm. having lost but 3·3 per cent. in nine days. A draft of cold air, the addition of some petroleum ether, and the employment of the centrifugal machine will be of service when operating on a large scale. The price of chloral hydrate ought not to be raised in consequence of such purification.—*N. Jahrb. f. Pharm.*, 1870, *April*, 200—204.

J. M. M.

ON BENZOIN AND BENZOIC ACID.

By Julius Loewe.

To determine whether benzoic acid exists free in benzoin, or whether it is generated by heating the resin, the author sought to answer the following four queries: 1. Does benzoic acid exist ready formed in benzoin? 2. Is benzoic acid in the resin united with a base? 3. Is benzoic acid formed through the influence of the air upon the fused resin? 4. Is benzoic acid a product of decomposition of a body contained in the resin?

A larger quantity of benzoin was intimately mixed. Three portions of it, each weighing 15 grm., were heated in the usual manner, in a dish covered with paper, one in contact with the air, one in a current of hydrogen and the third in carbonic acid;

2·2, 2·5 and 2·4 grm. benzoic acid were obtained; therefore, an oxidation of the resin to benzoic acid does not take place on fusion in atmospheric air.

30 grm. of benzoin were dissolved in 95 per cent. of alcohol and the filtered solution mixed with an alcoholic solution of caustic soda. A red brown sediment had occurred after 48 hours, which was well washed upon a filter with alcohol, dissolved in water and decomposed by boiling with muriatic acid; an amorphous precipitate separated, which, after filtering, yielded benzoic acid on being heated. If free benzoic acid had been contained in the resin, it would have entered the soda precipitate and been separated in crystals by the muriatic acid; since, however, it is obtained from the amorphous precipitate only by heat, the author concludes that benzoic acid as such was not present.

The filtrate from the soda precipitate was distilled; the amorphous residue dissolved in water, yielded with muriatic acid, a resinous precipitate, giving a copious sublimate of benzoic acid, while the acid filtrate on concentration yielded only small quantities of crystalline benzoic acid. The author concludes from this experiment that at least a portion of benzoic acid does not exist ready formed in the resin.

A portion of benzoin was dissolved in alcohol, the solution at the boiling point, precipitated with water, the alcohol distilled off, and the aqueous solution decanted from the sediment; this was treated four times in the same manner, at last the alcohol was not distilled off, but was removed with the water. The resin thus purified, behaves towards soda and muriatic acid essentially like the crude benzoin. The aqueous, faintly alcoholic solutions did not yield crystals of benzoic acid on evaporation; a small quantity of it, however was present, its crystallization being prevented by the presence of a resinous body.

These results led the author to the conclusion that some free benzoic acid is present in the resin, but that the greater portion is generated on heating, from one of the proximate principles contained in benzoin.

Of all the different apparatus recommended for the sublimation of benzoic acid, the author prefers that of Mohr, but recommends a steady temperature of 170° C. A flat vessel of iron or copper is connected with a glass tube bent upwards, into

which a thermometer is inserted, while the vessel is covered with paper. The purest acid was obtained by mixing the resin with an equal weight of crude oil of vitriol free from nitric acid; this mixture, put into a leaden vessel, is placed into the iron or copper vessel and then slowly heated to the above temperature to prevent its foaming over.—*Zeitschr. f. Chemie* 1870, *part* 9, 278. J. M. M.

ON THE FIXED OIL OF ALMONDS.

By Dr. H. Hager.

There is a considerable difference between the fixed oil expressed from the large sweet and from the smaller bitter almonds, which is readily shown by the elaidin test: the former oil congeals more rapidly and almost completely; while the latter congeals about twelve hours later and the more imperfectly, the smaller the bitter almond has been. The column of elaidin in the test tube obtained from the oil of the sweet and large sized bitter almonds is whitish or yellowish, of the smaller bitter almonds more yellow or brownish and surrounded by one or two thin liquid layers, proving that this oil approaches the drying oils. Only about one-third of its bulk congeals if the oil is from the small Oporto almond.

For medicinal purposes this difference between the almond oils is probably immaterial, since no distinction has heretofore been made between them. But for the last twenty years an almond oil is in the market which yields yellow or brown elaidin, surrounded by thickish liquid layers, and which, in Hamburg and other places, is prepared in large quantities from peach seeds, but sold as Ol. amygd. optimum or verum.

The author recommends the following test to distinguish true almond oil from the oil of peach and apricot seeds: equal volumes of the oil and 25 per cent. nitric acid are shaken together in a test tube; an emulsion like mixture is obtained, which separates again on standing. All true almond oils yield a purely white mixture, and after many hours the separated oil is still white. On heating the mixture to 60° C. almond oil remains white or becomes faintly yellowish white.

The oils of peach and apricot seeds shaken with the nitric

acid at once turn yellowish, the coloration increases and is in half an hour rather deep red yellow. Mixtures of almond and peach seed oil may be at first white, but after one-half to one hour will be more or less reddish yellow.

Many other oils, for instance ground nut oil (Arachis) behave to nitric acid like almond oil. Such an adulteration is readily discovered by sulphuric acid. Upon a porcelain slab 8 or 10 drops of the oil are stirred together with 5 or 6 drops of strong sulphuric acid. Almond oil is colored yellow and retains that color for some minutes; other oils, though often yellow at first, quickly turn green, greenish brown or brown.—*Pharm. Central halle*, 1870, 217, 218. J. M. M.

DECOMPOSITION OF CHLOROFORM.

By E. C. A. Biltz, of Erfurt.

The assertion of Dr. Hager (this Journal, page 319,) that chloroform prepared from pure chloral hydrate is not decomposed by light and air, is not correct. This so-called normal *chloroform is decomposed as readily as any other if it be absolutely free from alcohol.*

From ½ kilogramme of pure chloral hydrate I obtained 296 grm. chloroform, sp. gr. 1·498 at 15° C. (the theoretical yield is 306 grm., sp. gr. 1·502); it was very pure, entirely indifferent to sulphuric acid, but still contained some alcohol, to remove which it had to be washed six times with water. It was then dehydrated and rectified, when it had the sp. gr. 1·5019 at 15° C., a boiling point of 62·27° C., and was entirely indifferent to iodide of potassium. Exposed in a half filled white vial to the daylight, it showed, after ten hours, a reddish tinge with solution of iodide of potassium.* On the evening of the second day strong decomposition of this solution, and so on as previously described by me.†

This proves that chloroform prepared from chloral hydrate is prone to decomposition. How the stability of Hager's chloroform agrees with its sp. gr. and boiling point I am unable to say; however, he might have satisfied himself by comparative experi-

* 1 absolutely neutral iodide in 20 water, freshly prepared.

† See Archiv der Pharmacie, 1868, June, 209.

ments, that his tests for alcohol, in this case, are partly entirely useless, partly very difficult. Lieben's excellent test (iodoform) is the only one which, with the aid of the microscope, approaches mine* in delicacy; all others indicate at best ½ per cent., while in our case ⅛ per cent. and even less is of importance. I do not doubt, therefore, that Hager's chloroform still contains such traces of alcohol, and that it will yet decompose in the course of time.

I would again refer to my former paper on this subject, particularly to the proof that the officinal chloroform does *not* contain sufficient alcohol to prevent its decomposition. The final sentence in Hager's paper (p. 319 of this Journal) must, therefore, be rejected. As long as the officinal chloroform does not contain at least 2 to 3 per cent. of alcohol it must be kept and dispensed in black bottles, to guard against gradual decomposition in the light. And this is not altered in the least by preparing the chloroform from chloral. *Erfurt, May* 25, 1870. —*Pharm. Zeitung.*, 1870, N. 45, p. 276. J. M. M.

ON GLUCOSE.

By Prof. Charles A. Joy.

In the year 1811, Kirchhoff, a celebrated German chemist, discovered that it was possible to convert starch, by means of sulphuric acid, into sugar. Great expectations were founded upon the announcement of the discovery, as, in consequence of Continental wars and the English blockade, sugar had become a very dear article, and it was at first thought that an ample supply could be obtained in this way; but everybody was destined to be grievously disappointed as soon as the subject was more thoroughly investigated, and it was found that the sugar thus produced was of a different character from that to be obtained from the cane and beet. Still, the discovery of Kirchhoff was of great importance and has led to many practical applications. It was soon found that glucose or grape sugar could be made in

* 1 p. bichromate of potassa in 2000 water, mixed with one-eighth of its volume sulphuric acid. One volume of chloroform is well agitated with half a vol. of this mixture and set aside over night; disappearance of the yellow color proves the presence of alcohol.

several ways, and that it was always the product of the germination of starch grains, and sometimes occurred already formed in nature.

It is probable that both cane and grape sugar are formed from the starch contained in the cellular tissues of the plant, cane sugar being formed first, and then grape sugar, if acids be present. Acidulous fruits contain only grape sugar, whereas cane sugar occurs in those that are free from stronger acids. The chief natural sources of the grape sugar are in the sap of the grapevine, in plums, cherries, figs, honey, in the liver and in diabetic urine; but it would not be economical to prepare it from any of these sources.

One of the latest methods for the preparation of grape sugar is the one proposed by Maubré, and is as follows: The mixture of dilute sulphuric acid and starch meal is boiled under pressure of six atmospheres. The necessary boilers are similar to those used for high pressure engines, and are lined with lead and provided in the interior with a perforated lead tube for the passage of steam. The boiler is further furnished with safety valve, stop cocks, thermometers, &c. In the process of manufacture 56 pounds of sulphuric acid of 66° B. are diluted with 5,600 pounds water, and heated to 212° F. A mixture of the same amount of acid and water is made in a separate wooden vessel, the heat of which is raised to 86° F. Into the second mixture 2,240 pounds of starch meal are well stirred and heated to 100° F. This is gradually added to the first mixture, and after heating with open valves for a few minutes to 212° F., the stop cocks are all closed and the heat raised to 320° F. and continued until all of the starch is converted into sugar, which requires from two to four hours.

The contents of the boiler are then run into a wooden tank and 168 pounds of pure chalk or carbonate of lime, previously stirred up with 500 pounds of water, is gradually added to neutralize the acid; the gypsum is caught on a filter and the filtrate evaporated to 20° B., and afterward clarified by blood and bone black and again filtered. In this way the product is obtained pure and free from bitter and empyreumatic taste, and is well suited for any of the purposes to which grape sugar is adapted.

Another way is to convert the starch into sugar by means of

malt. For this purpose 10 to 12 pounds of barley malt are well stirred with 400 pounds of water, and to this are added 100 pounds of starch, and the whole is heated to 158° F., and kept at that temperature for several hours, under constant agitation. At 158° F. the starch becomes pasty, the grains burst, and at first there are no signs of sugar, but in a quarter of an hour the liquid becomes more fluid and begins to have a sweetish taste. Great care must be observed to retain the heat at the same temperature, not to have it either higher or lower than above indicated, and to insure this several thermometers ought to be put in different parts of the apparatus. After six hours the liquor can be filtered and clarified, and evaporated to a syrup. The sugar prepared in this way always retains the taste of malt and is only adapted to use in breweries, where this property will not prove deleterious.

Grape sugar, or glucose, can be prepared in open vessels by allowing a mixture of starch and water to flow gradually at a temperature of 130° F. into a vat containing water acidulated with one per cent. of sulphuric acid. By keeping it at a boiling point the starch is at once altered, without producing mucilage. The amount of starch taken is usually about one-half the weight of water employed. After all of the starch is added, boil for half an hour and decant. The sulphuric acid is neutralized by carbonate of lime as before and the liquid evaporated to the specific gravity of 1·28, and set aside to crystallize. The molasses is allowed to drain off, and the sugar is dried at a gentle heat in a current of dry air.

In the United States, especially in the West, it is more economical to make grape sugar from corn. There are several large establishments where this business is now extensively prosecuted. The corn is steeped in weak soda lye to separate the husk and soften the gluten. It is then ground wet and run through revolving sieves, by which the husks and gluten are separated. The starch flows through long ways and troughs, in which are slats against which the solid particles lodge, and thus separate from the water. The wash water is run into a large cistern, where it can be fermented into weak vinegar. The starch is put wet into a mash tub and treated with one per cent. sulphuric acid in sufficient water for three to eight hours. Where

it is intended to make sugar the whole of the starch is converted, but if syrup is sought then some part of dextrine is left unaltered. The acid liquor is neutralized with chalk as before, and evaporated in vacuum pans, and after the separation of the gypsum is run into barrels and allowed to crystallize. For syrup a certain percentage of dextrine is left in the liquid unconverted, which helps to keep it from crystallizing, and in the manufacture of syrup special care must be observed to neutralize all of the acids. The sugar is sometimes cast into blocks six inches square and dried on plaster plates, in a current of dry air, as hot air would be apt to discolor it. It has been found that glucose can be made from cellulose as well as from starch, but the process is too expensive for practice; it is, however, interesting from a scientific point of view, and ought to be mentioned in this connection.

Two parts of clean linen shreds are gradually added to three parts of sulphuric acid, and they are allowed to stand twenty-four hours; the whole is then largely diluted, and the sulphuric acid neutralized by carbonate of lime or carbonate of baryta. In a similar manner any other kind of cellular tissue, as cotton, wood shavings, paper, etc., can be converted into grape sugar.

It is a singular fact that, although we can prepare grape sugar from cane by the action of acids, no way is at present known by which glucose can be re-converted into sucrose. It would be a discovery of great importance if we could make cane sugar from glucose, as in that event common sugar could be prepared from a great variety of refuse matters, and would be largely reduced in price.

There was a time when much grape sugar was manufactured in England clandestinely, for the purpose of adulterating Muscovado sugar, but this illegitimate business was destroyed as soon as the tariff on sugar was reduced. The price of cane sugar must be very high before manufacturers can afford to make grape sugar for its adulteration.

The starch of potatoes can be converted into glucose by digesting for a few hours with parings of the potato. This operation is largely practised by German farmers in the preparation of food for fattening hogs. The starch is rendered more digestible in this way, and from the glucose some of the larger

proprietors manufacture alcohol, for which they obtain a high price.

An excellent article of starch sugar can be prepared from Indian corn, which will yield alcohol one-eighth cheaper and quite as pure as that from cane sugar. As, by a recent decision of our courts, the manufacturers of alcohol and vinegar from this source are not distillers within the meaning of the tax levy, the business is not hampered by licenses, inspections, or stamp duties, and has thus a great advantage over ordinary distilleries.

In some parts of Europe large quantities of grape sugar are used to add to wine, but in this country it is not so much the wine growers as the brewers who make such an extensive use of it as to give rise to its regular importation. This can hardly be justified excepting in times when the price of barley is very high.

We find in the *Zymotechnic News* of St. Louis, an interesting article on the uses of starch sugar in the manufacture of beer, from which we quote the following paragraphs:

"Barley contains on an average 57 per cent. of starch and cognate substances. These pass into the wort, partly as sugar, partly in the shape of dextrine (gum). The relative proportions of these ingredients vary in accordance with the method of brewing, but experience teaches that, on an average, one bushel of barley yields about 12 pounds of sugar and 15 pounds of dextrine. A portion of the latter substance is further transformed into sugar during fermentation, so that a bushel of barley represents, on an average, 16 pounds of sugar and 11 pounds of dextrine (gum).

"Both dextrine (gum) and sugar are equally essential to the brewing process. The latter furnishes the alcohol, without which no beverage can be called spirituous; while the former constitutes almost the entire extractive matter, or body of the beer, which is one of the chief distinguishing features between beer and wine. Now it is true that all (commercial) starch sugar contains a certain amount of dextrine—the more, the poorer the quality; but this portion would be insufficient in case a good article was used, while in the contrary case it would be paid for at an extravagant rate.

"Imported potato sugar of good quality, containing some 15 per cent. of dextrine (gum), costs about 12 cents per pound at New York. Maize sugar of equal purity can be furnished at 8 cents per pound. Twenty pounds of either article, costing respectively, $2 40 and $1 60, would yield 16 pounds of fermentable sugar and 3 pounds of dextrine (gum) while a bushel of barley will not only yield 16 pounds of sugar, but 11 pounds of dextrine or gum besides. Thus starch sugar can be added to beer wort only in small quantities, unless when it is desired to impart a

vinous character to the beer. When the latter object is not in view the best substitute for barley will always be found in maize or some other cheap grain.

"Not so in the manufacture of wine. For this purpose, good starch sugar, containing not exceeding 15 per cent. of dextrine, is decidedly preferable to cane sugar. A pound of the latter of the quality suitable for wine manufacture, costs at least 15 cent; whereas, as just stated, good starch sugar from maize can be sold at 8 cents. Now as 5 lbs. of starch sugar are equivalent to 4 lbs. of cane sugar as regards their yield of alcohol, the balance is altogether in favor of maize sugar, to wit:

4 lbs. cane sugar at 15 cents	60 cents.
5 lbs. grape sugar at 8 cents	40 cents.

"The 15 per cent. of dextrine (gum) contained in the maize sugar will (according to the usual proportion of sugar added to must) increase the amount of 'extract' in wine only by a few per cent., and will tend to give it the 'mouthly' taste (body) which in meager wines, already fermented, is sought to be produced by the addition of glycerine.

"Enormous quantities of cane sugar are already being consumed in the wine manufacture in this country; so that even as a consideration of national economy it is highly important to supply in maize sugar a partial substitute for imported cane sugar."

In France there is a use for grape sugar arising from the fact that the sugar manufacturers do not prepare molasses ready for the market as they do in this country. The crude molasses is bought up by second parties and the grape sugar is used very largely by them to extend it and give it body. An alkaline solution of grape sugar is converted by heat into a dark brown body, called *melassic acid.* This acid has a powerful affinity for oxygen, and reduces the Cu O to Cu 2 O. Some of the tests for grape sugar are founded upon this re-action. One of them, known as Fehling's test, is prepared as follows: A standard copper solution is made from 1 oz. crystallized sulphate of copper, 3 ozs. cream of tartar, $1\frac{1}{2}$ ozs. pure carbonate of potash, 14 or 16 ozs. of a solution of caustic soda, (sp. gr. 1.12,) and water until the solution measures 15,160 water grains; 200 measured grains of this solution contain a quantity of copper that would be reduced by 1 grain of sugar, each atom of sugar reducing 10 atoms of the black oxide of copper to the state of suboxide. Cane sugar is converted into grape by boiling with weak sulphuric acid, and it can then be easily tested by the standard solution. It sometimes becomes necessary to test for sugar in diabetic urine; this is accomplished in various ways. One of

them, called Trommers' test, is as follows: Add caustic potash, and filter if necessary, then dilute solution of sulphate of copper in small quantities; the precipitate that first forms dissolves on stirring, and the solution becomes azure blue, but after standing, a fawn colored precipitate of suboxide of copper will be formed. The conditions and precautions to be observed are fully given in medical works and need not be repeated here. The property of grape sugar to reduce metallic salts is made use of for the preparation of silver mirrors. Add to the nitrate of silver a few drops of ammonia and then some grape sugar, and the metal will be precipitated.

Chloride of silver can also be reduced by grape sugar, and this method affords a way for reclaiming photographic wastes, and of preparing pure metallic silver. Take 14 parts of well washed and still moist chloride of silver, 24 parts of caustic soda, sp. gr. 1·333, 11¼ parts ammonia, sp. gr. 0·925; to this add, with constant agitation in a flask, 7½ parts pure honey, or 9½ parts grape sugar syrup, and let the mixture stand in a warm place until sulphuretted hydrogen affords no sign of silver. Decant and wash out all traces of chlorine. The reduced silver can then be dried and melted in a crucible.

Platinum black, finely divided metallic platinum, can be obtained from the chloride by adding carbonate of soda in excess, and heating the solution for ten minutes. The precipitate can be collected in a filter, and then well washed and dried.

Grape sugar crystallizes in warty, cauliflower concretions composed of hard transparent cubes. It is less soluble in water than cane sugar, but more soluble in alcohol. Two and a half parts of glucose are required to produce the same sweetening effect as one part of cane sugar. Sulphuric acid does not decompose it, but forms a definite acid with it, called sulpho saccharic acid. It forms a double salt with common salt.

$$NaCl,2(C^{12}H^{12},O^{12})+2aq.$$

It also forms definite but unstable combinations with the alkaline bases.

From the foregoing it will be apparent that grape sugar can be easily and cheaply prepared, and that it is capable of many important uses in the arts if it could be manufactured in adequate quantity and at a reasonable rate.—*Journ. of Applied Chemistry, New York, June,* 1870.

OINTMENT OF MERCURIC NITRATE.

By R. Rother.

One of the most serious imperfections of the Pharmacopœia is its process for the ointment of mercuric nitrate. This is a failure in every respect, the nomenclature not excepted. The ever-recurring difficulties that the officinal formula engenders have caused the accumulation of abundant literature designed to obviate or remove some of these inherent obstacles. But even the enumeration of all the known processes has been of no avail. Most of the modifications that have been suggested are based upon the officinal process itself, and consist mainly of alterations in the proportion of the ingredients or their quality. But the officinal process is in the full sense of the term irrational; likewise must be any other which grounds itself upon this. Therefore the solution of this profound problem cannot be discovered in the components of the formula, but must be sought for in the operation alone. A review of all the known facts connected with the history of this preparation reveals as follows: Firstly, since the value of this combination is generally recognized, the title should be distinctive of its character. In this regard the Pharmacopœia completely fails. If the solution of the metal is officinally effected in contact with the acid at the ordinary temperature, it is positively certain that both mercuric and mercurous nitrate form, even in the large surplus of acid shown by the precipitation of mercurous chloride in the presence of chlorhydric acid, consequently the ointment will receive both nitrates from the beginning. Evidently, the lower the temperature at which the solution is made the greater will be the proportion of mercurous nitrate, in the same ratio the remaining acid, and through it the more powerful the oxidation of the fats. But the intenser the reaction the more probable will be the reduction of the mercurial salts, and especially the mercurous nitrate, which is eminently dissimilar in its effects and molecular constitution to the mercuric salt. The following equations will sufficiently illustrate the above:

$$3Hg+8(NO_3H)=3((NO_3)_2Hg'')+N_2O_2+4OH_2$$
$$6Hg+8(NO_3H)=3((NO_3)_2Hg_2)+N_2O_2+4OH_2$$

When these mercurial solutions come in contact with the heated glycerides, the complicated reaction which immediately ensues commences with two distinct phases. One of these is characteristic only for the so-called non-drying oils; the other is pretty general with all. The first of these is determined by the catalytic action of the nitrogen tetroxide (which is always present in the mercurial solution prepared without heat, and should it not be present, as would be the case by employing a solution containing the mercuric nitrate only, it would of course simultaneously result from the mutual decomposition of the nitric acid and the fats), and consists in the transformation of the liquid triolein into its white concrete and crystalline isomere elaidin. But the second, which is characterized by the violent evolution of volatile products, consists, according to the prolongation of the reaction or its intensity, favored by external causes, and the relative quantity of nitric acid, of the destruction of part of the oleic, palmitic and stearic acid contained in the glycerides that are usually employed.

But the complete dissociation of the original compounds is effected with difficulty. Pure lard, heated with 8 and 10 times the quantity of strong nitric acid until the latter was dissipated, still was attacked by a fresh portion. In this case, all of the 9 volatile acids of the series $C_nH_{2n}O_2$, from acetic to capric inclusive, are produced together with fixed acids of the series $C_nH_{2n-2}O_4$, of which suberic and succinic acid are more abundantly produced from glycerides containing chiefly palmitin. A peculiar and undetermined substance is invariably generated in quantity, and resists the destructive action of the nitric acid with remarkable obstinacy. This is an intensely yellow oil, which saponifies with potassium hydrate, with the formation of a deep red color; and it is this compound to which the ointment of mercurial nitrate owes its yellow color. It is supposed that the discoloration of the officinal ointment occurs more particularly when the oxidation of the fatty matter has not been sufficient, and that subsequently the avidity of these bodies robs the mercurial salts of their oxygen and reduces them to the metallic state; but in the officinal ointment the greater part of the mercury no longer exists as normal nitrate, but chiefly as basic nitrate and mer-

curous or mercuric salts of some of the fatty acids either originally existing in the fat or as products of its decomposition. This is amply evidenced by employing a drying oil, as the oils of cotton or flaxseed, in the preparation of the ointment, which of course, as will be seen, are entirely inadmissible for this purpose. If flaxseed oil, for instance, is heated with nitric acid alone, even until the latter is entirely consumed, no separation will take place; but if to the heated oil the mercurial solution be added, a greenish-yellow agglutinated mass immediately separates, which adheres to the bottom of the vessel and the stirrer too tenaciously to admit of distribution, and moreover hardens on cooling to the consistence of lead plaster. Strong cold nitric acid has no apparent action on this substance; neither have oil of turpentine, alcohol, ether and carbon disulphide, when repeatedly treated with these solvents in succession; but chloroform dissolves the greater part of it, leaving a grayish, light, flocculent deposit, which agglutinates on the addition of alcohol. Cold strong nitric acid attacks this powerfully, forming a green solution containing abundance of mercuric oxide. At the same time a yellow, oily substance separates, which completely dissolves in chloroform—also in ether, but slowly and imperfectly in alcohol—to an intense yellow color, and saponifies with potassium hydrate to a deep red color. The original resinous substance, as it separates from the supernatant oily liquid, is but faintly acted on by cold strong nitric acid; but the same acid when hot dissolves all but a yellow oil which separates from the solution, and contains mercury in abundance, as the black precipitate with ammonium sulphide indicates. The first chloroformic solution of the resinous deposit when evaporated leaves a reddish-yellow, varnish-like residue, which is insoluble in water, but readily saponifies with potassium hydrate to a red solution, whilst a small quantity of mercurous oxide at the same time separates. By the addition of nitric acid to a solution of this soap, a yellow precipitate again occurs.

The separation of this resinous deposit at the very outset of the operation goes to show how easily the mercurial nitrates are reduced by heat, or, more particularly, by the combined influence of temperature and the reducing property of the organic

substances, even in the presence of a large excess of free nitric acid, which seems to indicate, in this instance at least, that the replacement of the hydrogen atom of the acid molecule through the mercurial atom renders it more unstable in the presence of organic matter, and therefore a more powerful oxidizer.

The evolution of nitrogen dioxide during the solution of the resinous remnant insoluble in chloroform would also indicate that the body contained either metallic mercury or the suboxide. This supports the supposition that the mercurous compounds are less stable than the mercuric under similar circumstances. It also affords incontrovertible evidence that in the officinal ointment the smallest portion of the mercury exists as nitrate, and that the greater portion can be present in an indefinite variety of forms. Therefore, the only form in which the metal should be combined is as mercuric nitrate, and the title should designate it accordingly.

Secondly—A portion of the fatty substance which the formula demands cannot be obtained unless the pharmaceutist prepares it himself, because an officinal neat's-foot oil does not exist in the market, but a rank and disgusting semi-fluid grease, which possesses none of the officinal characteristics. But pure lard can always be readily obtained, and, since it furnishes an excellent ointment, should invariably be used.

Thirdly—The manner of executing the officinal operation is the very embodiment of failure. In this process it is of the utmost necessity to employ vessels of immense proportionate size. It is a point of great importance to retain the temperature of the heated fats within certain limits, which is an exceedingly difficult office to perform after a violent reaction has set in; and even with all these precautions the ointment may overflow or its color be impaired from reduction of the metal by too great a heat. The production of a good ointment by this process is, therefore, a matter of chance, and depends upon circumstances that seem rather the good luck of the operator than a well-defined pharmaceutical process.

Now all these difficulties can be readily overcome by an entire change in the operation itself, regardless of the component elements of the formula. The new process rests upon a

scientific basis whose characteristic feature pervades it in every detail, and which must therefore invariably yield a uniform and definite result. Two parallel operations, separate and distinct, unite their perfect results to one complete and unchangeable whole. The formation of mercuric nitrate is effected with the requisite quantity of nitric acid, and the remainder is completely consumed in the oxidation of the fats. This insures the ultimate existence of but one compound of mercury in the finished product, and that is, as the title implies, the mercuric nitrate. It likewise admits of the oxidation of the fatty matter to the utmost capacity of all the available nitric acid, so that when the last vestige of this has disappeared the mercurial solution can be mixed with the nearly-cooled product without causing any farther reaction. A very decided advantage of this process is that the enormously large vessels can be dispensed with. The nitric acid is added to the melted fat, and the heat continued until brisk ebullition sets in. This occurs mainly in the centre of the mixture, and without frothing. It is, however, of the utmost necessity not to disturb the liquids by stirring. If the reaction becomes too violent, the mixture must be removed a short time from the fire; and if the action slackens too much, it must be replaced. Finally, when all the nitric acid has been decomposed, the temperature can be considerably raised without causing any farther effervescence. The boiling then is analogous to the boiling of fatty matters in general.

From the foregoing results the following formula is deduced:

Take of Mercury	$1\frac{1}{2}$	troyounces.
Nitric Acid, sp. gr. 1·42, .	$3\frac{1}{2}$	"
Lard (pure) . . .	$16\frac{1}{2}$	"

Dissolve the mercury in 900 grains of the nitric acid, with the aid of heat, and keep the solution gently warm to prevent crystallization before it is used. Melt the lard in a suitable vessel, with a moderate heat; then add the remainder of the nitric acid, and continue the heat, *without* stirring the mixture, as long as moderate effervescence continues; but if this becomes too violent, remove the mixture from the fire, and only replace it when the action slackens too much. Finally, when effervescence ceases and the liquid only boils even under an increased heat, remove

the mixture from the fire altogether; and when it begins to stiffen, add the mercurial solution, and mix thoroughly.—*The Pharmacist, Chicago, July*, 1870.

REPORT ON CINCHONA CULTIVATION IN BENGAL.

From C. B. CLARKE, ESQ., M.A., *Officiating Superintendent, Botanic Garden, and in charge of Cinchona cultivation in Bengal, to the Secretary to the Government of Bengal,—(No.* 188, *dated Botanic Garden, Calcutta, the* 29*th April*, 1870).

Sir,—I beg leave to submit the annual report on the cultivation of Cinchona in Bengal for the year ending 31st March, 1870.

2. The three species of cinchona of which the cultivation has been extended during the year are *C. succirubra, C. officinalis*, and *C. calisaya.*

The number of plants of these species in permanent plantations were as under:—

	C. succirubra.	*C. officinalis.*	*C. calisaya.*
March 31, 1869	615,730	312,719	220
March 31, 1870	1,055,100	406,899	4,000
Increase	439,370	94,180	3,780

3. The increase of permanent plantation of *C. succirubra* and *C. calisaya* has been made about Rishap at an elevation of 2500 feet; the increase of *C. officinalis* at Rungbee at an elevation of about 4500 feet.

4. The average growth for the year of the ten measured plants of *C. succirubra* planted in March, 1867, at Rishap, has been 51 inches, which fairly represents the satisfactory general growth of the *C. succirubra* plantations.

5. The average growth for the year of the ten measured plants of *C. officinalis* planted in October, 1864, at Rungbee, has been 12 inches, which fairly represents the unsatisfactory general growth of the *C. officinalis* plantations.

6. The average growth for the year of the ten measured plants of *C. calisaya* planted in June, 1867, at Rishap, has been 52 inches, which represents the average growth of all the plants in the plantation catalogued as *C. calisaya*. But several important varieties are included under the name *C. calisaya*, and the tree variety raised by seed in February, 1867, and planted out in June, 1867, has attained a height of 12 feet in October, 1869, and a tree of this age, lately cut down, has produced two pounds of dry bark.

7. As fully explained by Dr. T. Anderson in his annual cinchona report in Bengal for the year ending 31st March, 1868, the exceeding steepness of the hills, combined with the large rainfall, prevents any tilth on these cinchona plantations. The grass and low jungle having been cut close, the young cinchona plants are planted out in the permanent plantations. The weeds having been merely headed down, not eradicated, grow with great strength in a moist and warm climate, and continual scouring of the young plantations is necessary. This is the chief expense under this system of cultivation.

8. *C. succirubra* and *C. calisaya* (tree variety) grow so freely, that by the third year the young trees in the plantations are all locked; they then crush the jungle beneath them, and can take care of themselves, and little further expense upon them is called for.

9. But *C. officinalis* shows no inclination to become a tree at these plantations; it remains a shrub with very scanty foliage, and even on the plantations which are five years old, there continues the same expenditure in scouring.

10. *C. succirubra* and *C. calisaya* are planted about 1200 to the acre; *C. officinalis* about 4000 to the acre.

11. In the fifth year of growth in permanent plantation an acre of *C. officinalis* carries less than one-fourth the bark carried by an acre of *C. succirubra*, and costs more than four times as much annual expenditure. Moreover, the *C. officinalis* then appears disinclined to grow much larger, whereas *C. succirubra* will clearly grow into a considerable tree.

12. I calculate that at present it has not been discovered how to grow *C. officinalis* to economic profit at Rungbee. I there-

fore stopped its extension in September last, though I was aware of the high quality of the grey bark. The present quantity is large for an experiment; and, as an experiment, a few acres of *C. officinalis* were planted in September last at a somewhat higher level (5000 feet) than the main plantation. Also, in all the *C. officinalis* plantations below the level of 4000 feet (above which level *C. succirubra* does not thrive), *C. succirubra* has been planted between the ranks of *C. officinalis*, and will, doubtless, soon overgrow it.

13. The propagation and extension of *C. calisaya* has been pushed as fast as possible. There is no difficulty in multiplying *C. succirubra* and *C. officinalis* by cuttings, but at Rishap there is found the greatest difficulty and uncertainty in multiplying *C. calisaya* by cuttings. Herr von Gorkom, the Director of the Dutch Government cinchona cultivation in Java, informs me that there the same difficulty with *C. calisaya* is found; but, on the other hand, Mr. M'Ivor, in the drier climate of the Nilgherries, says cuttings strike with perfect success.

14. Her von Gorkom has sent me on several occasions most valuable packets of *C. calisaya* seed, which germinated excellently; but if it could be discovered how to grow *C. calisaya* by cuttings, I should greatly prefer that method, as by it I am sure of getting exactly the variety which I wish to propagate. Mr. M'Ivor is of opinion, that not merely do the varieties cross freely, but that many hybrids are formed from different species of cinchona.

15. The most valuable bark known in the European market is the *C. calisaya* bark; this species grows admirably at Rishap, and, during the past year, propagation has been almost entirely confined to it. In growing for profit, I believe it will ultimately be found advisible to grow one or two species only on these plantations; and that it is best to discard a species at once which is clearly inferior with us to *C. calisaya* and *C. succirubra*.

16. I have lately brought from the Nilgherries two new kinds of cinchona, one provisionally named *C. mirabilis*, of Mr. Broughton, the other *C. pitayo*. In *C. mirabilis* the bark contains the astonishing quantity of 13½ per cent. of quinine alkaloid, and more than 9 per cent. of crystallizable quinine. *C.*

pitayo is a rich bark from Peru, a very high-level species, said to be found growing through the snow.

17. During the year both *C. succirubra* and *C. officinalis* ripened seeds; 5¾ ounces of the former and 5¼ ounces of the latter were distributed. One ounce of seed will raise nearly 50,000 plants.

18. There were distributed from Rungbee during the past financial year cinchona plants as under:—

	C. succirubra.	*C. calisaya.*	*C. officinalis.*
Mr. Werniche, Kursiong . .	2500	50	
Dr. Jameson, Saharunpore .	1500	260	500
Mr. Robson, Tukvar		200	
Col. Strutt, Kangra Valley.		12	
Total . . .	4000	522	500

19. The amount of propagation having been greatly reduced, a considerable number of the old frames and glass were sold. The receipts for the past year of the cinchona plantation paid into the Darjeeling treasury were as under:

	Rs.	As.	P.
Rent from land let	1130	0	0
Price of a wardian case . . .	10	0	0
Sale of cinchona plants . . .	156	4	0
Sale of old glass	187	8	0
Total . .	1483	12	0

20. The total expenditure for the year on the Sikhim cinchona cultivation was Rs. 50,224, being Rs. 18,642 less than the estimate, and Rs. 18,040 less than that of the preceding year.

21. The *C. succirubra* trees stand 6 feet by 6 in the plantations, and, as an experiment in January last, a small portion of the denser plantation was thinned by cutting down three trees out of every four. This was found to produce 300 lbs. of dried bark, worth about Rs. 250 per acre.

22. At the same time a considerable portion of the more advanced trees were pruned by the removal of the lower branches. There was stored from the thinnings and prunings in all 2400 lbs. of dried bark.

23. The only private plantation in Sikhim, which (so far as I know) is extending cinchona planting on a considerable scale, is that of Mr. Lloyd and Colonel Angus, known as the Darjeeling Cinchona Association, and which occupies the north side of the Rungbee valley. This Association has now about 500 acres of permanent plantation of *C. succirubra*, and has cut a considerable quantity of the three-year-old bark during the late cold weather, and sold it in the London market.

24. The Government cinchona plantations at Nunklow, in the Khasi Hills, was formed for the supply of cinchona plants to the planters in Assam and Cachar. Seed is now easily transmitted, and I believe the discontinuance of the plantation at Nunklow has been decided upon by Government.

Number and distribution of Cinchona plants in the Government plantations near Darjeeling on the 31*st March*, 1870.

Name of species of cinchona.	Number in permanent plantations.	Number of stock plants for propagation.	Number of seedlings or rooted cuttings in nursery beds for permanent plantations.	Number of rooted plants in cutting beds.	Number of cuttings made during the month.	Total number of plants, cuttings, and seedlings.
C. succirubra	1,055,100	20,000	164,615	None	None	1,239,715
C. calisaya	4,000	10,000	8,758	32,274	2,000	57,032
C. micrantha	29,667	None	None	None	None	29,667
C. officinalis, and varieties.	406,899	10,000	205,952	307,853	Ditto	930,704
C. pahudiana	5,092	None	None	None	Ditto	5,092
Total	1,500,758	40,000	379,325	340,127	2,000	2,262,210

C. B. CLARKE,

Officiating Superintendent, Botanic Garden, and in charge of cinchona cultivation in Bengal.

—*London Pharm. Journ. Aug.* 6, 1870.

THE PRODUCTION OF IODINE AND BROMINE.

BY W. H. CHANDLER.

To Scheele is the world indebted for the first intimation of the elementary existence of fluorine and chlorine, he having in 1771 referred the action of sulphuric acid upon fluor-spar to the freeing of a distinct acid from the mineral, though whether fluorine has, even up to the present day, been isolated, is a matter of great doubt. In 1774 the same chemist isolated chlorine. In 1811 Courtois separated iodine from the waste liquor from the manufacture of soda ash from sea-weed, followed by the discovery of bromine in the bittern of sea-water by Balard in 1826. The isolation of these four closely-allied elements from their compounds is thus included in a century, and the application of them to economical purposes, to any extent, was accomplished since the beginning of the present century. Their close relationship, their physical properties, and their chemical affinities, which are nearly in an inverse proportion to their chemical equivalents, induce one to the supposition that they are modifications of the same element.

The isolation of chlorine, bromine, and iodine from their compounds with the alkalies, is accomplished with equal facility. But the abundant store of the former in the enormous deposits of salt throughout the world and in solution in the ocean and inland seas, forms a striking contrast to the rarity of the two latter halogens. In combination with silver, bromine and iodine are found in some rare ores in Mexico and South America. Chatin claims to have detected iodine in rain-water, though in very minute quantities, and even in the atmosphere. In sea-water traces of it have been uniformly detected, though not in quantities sufficient for quantitative estimation. Bromine exists in slightly larger quantities, and, associated with iodine and chlorine, is found in the ocean and inland seas, the various mineral and saline springs, and salt deposits throughout the world.

According to Von Bibra, the amount of bromine in the Atlantic Ocean, in one United States gallon, is 24 grns.; in the Dead Sea, examined by Herapath, 121·5 grns.; in the dried residue of the Mediterranean, 1·15 per cent.; in the mineral spring of

Kreushnach, Ure found 10·8 grns.; in Kissengen water, determined by Kastner, 0·44 grns.; at Tenbury, in Worcestershire, examined by Dr. Ure, as high as 12·5 grns.; and at Arnstadt, according to Hartung, 13·6 grns. Iodine occurs in far less quantities, from mere traces to 2·2 grns. per gallon, this latter quantity being found in the iodine spring at Halle.

In the United States, both bromine and iodine have been detected in the various saline and mineral springs. Iodine was first detected in this country, in the Saratoga Spring waters, by Drs. Usher and Steel, in 1830, and bromine in the same waters by Dr. A. A. Hayes, and in the salines of Onondaga by Prof. B. Silliman, in the same year. The quantity of bromine in the spring waters of Saratoga county, determined by Prof. Chandler, reaches 3·63 grns. per gallon in the water of one of the Artesian wells, the largest amount of iodine found being 0·2 grn.; but in this country, as in Europe, it is in the salines that the quantity of these substances becomes of economical importance, and in a brine of the Saginaw valley, Dr. Chilton found 7·65 grns. of bromine; at Tarentum, Pa., 6 grns. bromine and 4 grns. iodine were reported by Stieren; in the Salina brine analyzed by Prof. Goessmann, however, only 1·36 grns. of bromine per gallon are reported.

Besides these various sources, iodine has been detected in the soda deposits of Peru, in the ashes of sponges, and in the ashes of the Spanish barilla plants. Cod-liver oil is said to owe some of its medicinal properties to a trace of iodine. Though the distribution of bromine and iodine is thus very general, yet owing to their existence in such comparatively minute quantities, the sources of our commercial supply are much more restricted.

Up to the beginning of this century the alkalies of commerce were derived from the ashes of plants, and the burning of seaweeds was an important industry, especially in Great Britain and Ireland.

The amount of ashes of sea-weed, the so-called kelp, reached its maximum production in 1800, when 20,000 tons were collected. To produce this, 400,000 tons of wet weed were burned. From this time, owing to the removal of the import duty and to the introduction of the manufacture of soda ash from common salt,

the trade declined. But the discovery of iodine in the mother liquors of kelp salts, somewhat revived the manufacture,—and it is to this source alone that the total supply of iodine in commerce is due. The high price stimulated the business, and in this country, in a few places in New England, iodine factories were established. These latter, however, were soon abandoned, the weed upon our coast being of poor quality. The process of separating the iodine is exceedingly simple, being nearly analogous to that for the isolation of chlorine. The ashes are leached with water, and the various crystallizable salts of potash and soda are separated by concentration. Carbonates, sulphates, and chlorides of potash and soda are thus removed, leaving in solution sulphite, hyposulphite, and some carbonate of soda, together with the iodides and bromides. By the addition of sulphuric acid the first three salts are decomposed, and the sulphate of soda produced is removed by crystallization. The concentrated mother-liquor is acidulated with sulphuric acid, and after the addition of binoxide of manganese, the iodine and bromine distilled off. The reaction may be represented thus:

$$NaI+MnO_2+2(HO,SO_3)=NaO,SO_3+MnO,SO_3+I.$$

The bromine of commerce was derived mostly from salines until the salt mines of Stassfurt were opened; the Schoenebeck salt springs, near Magdeburg, producing the greater part of the supply for Germany. The method of manufacture is similar to that followed in the separation of iodine.

Upon opening the mines of Stassfurt, bromine was found in the mother-liquors in considerable quantities, and at present the principal part of the European product is derived from this source. As high as 300 grns. per gallon has been obtained from these mother-liquors. Although but two or three of the manufactories at this place have economized this substance, the price of bromine has greatly decreased during the last five years. This decrease has been hastened by the large production of bromine in the United States.

Although the amount of bromides in the Saratoga waters is considerable, yet the comparatively limited flow of water here and the large consumption of these waters for medicinal pur-

poses precludes the manufacture. But from the strong salines our supply is derived in large quantities. At Tarentum, Sligo, and Natrona in Western Pennsylvania, Pomeroy, Ohio, and Kanawha, West Virginia, the manufacture of bromine has become of considerable importance. The production of 1870 will reach 125,000 lbs., a quantity probably in excess of our consumption. In 1867 the Stassfurt product of bromine was nearly 20,000 lbs.

The total product of iodine in Great Britain and France is about 200,000 lbs. annually, and outside these two countries very little is produced. As the average product of iodine is about 10 lbs. to the ton of kelp, and it requires 20 tons of wet weed to produce one ton of kelp, this total product represents the burning of 400,000 tons of sea-weed. At the present price, the iodine produced is of more value than the alkaline salts, which were the original object of the industry.

As previously stated, iodine is not produced in the United States. Since its use was first established here the price has fallen from $16.00 to about $5.00 per lb. At present, bromine is furnished for less than $1.50 per lb.

The chief consumption of bromine and iodine is for medicinal purposes in the form of iodides and bromides of potash, soda, or ammonium. A small proportion is consumed in photography. Bromine has been proposed as a discharge in calico printing, and during the late war was to some extent employed as a disinfectant. As yet, but a small proportion of the bromine of the saline mother-liquors is economized; but should the manufacturers turn their attention to this important substance, the consequent reduction in price will render its economical employment in other directions possible.—*Amer. Chemist, Aug.*, 1870.

NEW SULPHUR DEPOSIT.

Sulphur is a substance which has, if not a fragrant, at least a decided odor, and is useful, both internally and externally. Besides these purely personal uses, it is largely used in this country in the manufacture of sulphuric acid, and for other manufacturing purposes. As a matter of course the source of supply be-

comes a matter of consequence, especially to proprietors of extensive manufacturing works.

We are glad, however, to know, and to be the first to announce, that a source of supply has been discovered much nearer home. It is in the Island of Saba, which is one of the Dutch West Indies, and is situated about 110 miles south-east from St. Thomas, and 40 miles south-west from St. Martha's. Like its Italian prototype, the island is of volcanic origin, being about eleven miles in circumference, and at its highest point about 2,800 feet above the sea. Though a Dutch possession, the language spoken by its two thousand inhabitants is chiefly English.

The sulphur deposit referred to was discovered by an enterprising New Yorker, who found himself there on a search for health, and, finding indications of sulphur ore, set to work with pick and shovel, and with the help of some natives quarried two sloop loads, which he brought here and submitted to analysis.

The report of the chemists employed is to the effect that while the Sicily ores only yield about thirty per cent. of brimstone for the ore consumed, the Saba ore yields an average of over sixty per cent. Adding to this the fact that the island is only about fifteen hundred miles from New York, it will be seen that this is an important discovery, and it need not be wondered at that steps have already been taken to secure leases of the best tracts on this island. We understand that this has been done, and that the importation of crude brimstone will soon be commenced. —*Drug. Circular, New York, June,* 1870, *from N. Y. Times.*

THE ROASTING OF COFFEE.

In distilling a cold prepared extract of roasted coffee with lime or magnesia, an alkaline distillate is obtained, which by evaporation after the addition of hydrochloric acid, and extracting with alcohol, yields a pure chloride of methylammonium. This salt is a chloride of ammonium, in which one equivalent of hydrogen is substituted by methyl, the radical of methylated spirit or methyl alcohol, this being the lowest one in the series of alcohols, of which ordinary alcohol and ether are representatives. This product is formed by the decomposition of caffein, when

combined with tannic acid, as is the case in all coffees, pure caffeine yielding different products of decomposition, among which is cyanogen. In roasting coffee part of the caffein is volatilized together with some methylammin, while the larger amount remains with the coffee itself. Half of the caffein of the coffee is decomposed in this way; one sample, which before roasting tested 1·45 p. c., yielding afterwards only 0·65 p. c. of caffein. The temperature at which these changes are effected is, in the case of green coffee (Porto Rico), 275° C.; in the case of yellow coffee (Java), 250—255° C.

Caffein is soluble in bisulphide of carbon and in benzole; in benzole especially, to such an extent that it may be used with advantage for the preparation of the pure alkaloid.—*Drug. Circular, New York, June*, 1870.

AMMONIA GUNPOWDER.

By M. A. Jouglet.

The owners of the Nora-Gyttorp Powder Mill, Sweden, have brought out a new kind of powder, which contains, it appears, a mixture of nitrate of ammonia and nitrate of potassa (with what other substance is not said). This material is, according to some accounts, a more powerful explosive than nitro-glycerin, and cannot be ignited, or made to explode, but by the impact of a blow, or a falling weight, or by the detonation of a small cartridge containing common gunpowder. Experiments made at a military establishment at Berlin with this powder have proved that, while ordinary gunpowder, gun-cotton, nitroglycerin, and dynamite take fire the moment flame is approached, this powder did not do so. As regards the effect of the impact of a blow of a falling weight (the same, of course, in each case), ordinary gunpowder requires for explosion that the weight falls from a height of between 4 and 5 ft.; nitroglycerine, 1½ ft.; dynamite, 2¾ ft.; and ammonia gunpowder, between 12 and 15 ft. A sample having been sent to France from Berlin did not, the author says, confirm the high opinion this substance is thought worthy of in Prussia.—*Chemical News, London, Feb. 25th*, 1870.

UNGENTUM SABINÆ.

By T. H. Bateman.

To judge from the limited demand for this ointment, it does not now find much favor among the medical profession generally, although, in the opinion of some eminent surgeons, forming one of the best external irritants and escharotics we have, acting much more efficiently in keeping open blisters, etc., than does the ung. elemi of the British Pharmacopœia, which, to some extent, has taken its place.

Looking at this ointment from a pharmaceutical point of view, it is exceedingly unsatisfactory; the specimen I have before me (supplied by a London wholesale house) is perfectly rancid, and resembles in appearance "old green elder ointment."

Dr. Royle says, "When made in a porcelain vessel, or a water-bath, it is of a yellowish-green color, efficient and active, and will keep good for a long time," which it certainly does not, as far as my experience goes.

The B. P. orders fresh savin-tops, collected in spring, to be used, thus compelling manufacturers to make their year's stock at once, which is decidedly objectionable, as it is thus frequently sent out rancid. Although this condition does not in any way interfere with its effect as an irritant, yet it prevents its coming under the category of "elegant preparations."

Pharmaceutists (excepting those in a large way) are in the habit of trusting to their wholesale druggists for it, the demand, as a rule, being too small to justify their making even the quantity ordered in the Pharmacopœia; besides, made on a small scale, it is exceedingly wasteful, the savin-tops being so bulky as to render it difficult to strain the ointment from them.

For satisfaction's sake I have prepared some myself, adopting the following somewhat modified formula, which differs only from the B. P. in the addition of gum benzoin:—

Fresh Savin-tops (bruised) . . .	8 oz.
Yellow Wax	3 oz.
Prepared Lard	16 oz.
Gum Benzoin (coarse powder) . . .	1 oz.

Melt the wax and lard on a water-bath, add the gum benzoin, and

digest for half an hour, constantly stirring, then add the savin-tops, and further digest for twenty minutes; lastly, strain with pressure through calico or flannel, stirring occasionally until cold.

Resulting ointment, pale yellowish-green, with the odor of savin distinctly marked, which odor I have failed to detect in most, if not all bought specimens. The addition of gum benzoin (judging from its preservative effect on other ointments) will, in this case, I hope, tend to prevent any decided change from taking place.—*Pharm. Journ.*, *July* 2, 1870.

Manbey Grove, *Stratford*, *June* 2*d*, 1870.

ON THE USE OF TINFOIL FOR PRESERVING SUBSTANCES LIABLE TO CHANGE ON EXPOSURE TO AIR.

By Ernest Baudrimont.

Tin reduced to thin sheets has for many years been employed for preserving a great number of substances from the action of air and moisture. The thin leaves (foil) of this metal are essentially repellent of moisture. When cemented to the surface of damp walls, they protect the paperhangings which may be afterwards applied, and they are in like manner used for lining the interior of boxes and drawers in which dried medicinal leaves and flowers are kept. It has long been the practice to enclose chocolate in tinfoil, to prevent the fatty matter contained in it from soiling the paper which forms the outside wrapper; in the same way butter of cacao itself is preserved, and some sorts of sweetmeats, sausages, and cheese are among the articles similarly protected. Tobacco-pouches are lined with tinfoil to preserve the flavor and humidity of the tobacco. Cakes of opium are kept in a moist and uniform state by wrapping them in this material, and bisulphate of soda is kept in the same way, for use in making artificial Seltzer water with Briet's apparatus. Lastly, on account of the opacity of tinfoil to the rays of light, bottles are coated with it for the purpose of excluding light from vegetable substances which would be injured by its action.

Notwithstanding the knowledge of all these facts, it might be said that the application of tinfoil for the preservation of sub-

stances liable to change is still rather limited, and there seemed to be a prospect of its admitting of a more general use than has hitherto been made of it. At the same time there was an absence of any precise experiments for the purpose of determining in a scientific manner the degree of impenetrability of tinfoil. Having been engaged for some time in the investigation of this subject, I have obtained the following results:—

For many years past I have observed that cacao butter, which readily becomes rancid even when kept in bottles into which it has been introduced in the melted state, if the bottles be opened from time to time, does not undergo the same change when moulded in tablets and wrapped in tinfoil. This fact, which was confirmed by many observations, and could only be explained by assuming the impenetrability of tinfoil to atmospheric air, formed the starting-point for some experiments in the same direction, which proved satisfactory. Thus, a piece of well-burned quicklime, enclosed in a double wrapper of tinfoil, was exposed in the atmosphere of the laboratory by the side of another similar piece which was exposed without protection. While the latter became slacked, that which was protected by the tinfoil, and weighed 92·2 grams on the 1st of December, 1867, had only gained 3 decigrams in weight at the expiration of a month, and after being kept until the 25th of March, 1868, it had only increased to 94 grams. It had thus gained only 1·8 grams in four months. On being then taken out of its metallic envelope much heat was developed from absorption of moisture, and it fell into powder.

Satisfied by this experiment of the efficacy of tinfoil for preserving bodies from the action of air and moisture, it seemed probable that substances the most susceptible of change might be kept in the same way. It was found that substances so deliquescent as chloride of calcium and liver of sulphur, and efflorescent salts such as carbonate and sulphate of soda, remained almost unchanged when wrapped in tinfoil, increasing or diminishing only to a few thousandths of their weight in several weeks.

Other experiments were made of a more precise character. It is well known that fresh lemons become rapidly dried and ultimately hard when exposed to the air, and that they also become perished and covered with mould. I had endeavored to

prevent this drying and moulding by placing the lemons in close vessels, in dry air, in sand, and also in bran, but none of these methods proved efficacious. Thus, for example, in twenty-one days the lemons lost on an average, 17·33 per cent. of their weight in sand, and 17·13 per cent. in bran. Experiments were made for the purpose of ascertaining the effect of enveloping the fruit in tinfoil, and also of coating it with a film of collodion. Some of the fruit prepared in each way, and some unprepared, was weighed, exposed to the air, and again weighed at intervals of a month. This method was applied to lemons and oranges, and the following results were obtained:—

1. The unprepared fruit became rapidly dried. In two months the lemons had lost 42 per cent. of their weight, while the oranges, in the same time, had lost only 26 per cent.

2. Collodion, when applied to the fruit alone, exerted but a feeble preservative influence in retarding spontaneous evaporation. In two months lemons coated with collodion had lost 29 per cent., and oranges 22·5 per cent.

3 Tinfoil almost entirely prevents the drying of the fruit. In two months lemons lost only 1·58 per cent., and in three months 3·16 per cent. In one case, indeed, the loss was only 0·92 per cent. during the longer period. Oranges lost about 5 per cent. in two months. On the removal of the metallic envelope, the fruit was found to be as fresh and fragrant as when the experiments were commenced. These observations and experiments will tend to show the remarkable power of tinfoil in preserving substances enclosed in it from the influence of air and moisture derived from air, and may induce those who are interested in the subject to extend the application of this preservative means.—*Lond. Pharm. Journ., July* 2, 1870, *from Journ. de Pharmacie et de Chemie.*

CULTIVATION OF IPECACUANHA IN INDIA.

The Supplement to the "Gazette of India" of 23d January, 1869, contained a strong representation to Government from the Inspector-General of Hospitals, dated 5th October, on the advisability of introducing the cultivation of the ipecacuanha plant in an analogous manner to that of cinchona.

The suggestion was forwarded to Dr. Anderson, the Superintendent of the Botanical Gardens, Calcutta, who stated that he had, for some years past, thought of the subject, but had been unable to procure any plants on trial until April, 1866, when one plant was sent out overland by the Director of the Royal Gardens at Kew. This original plant died soon after arrival, but, at the date of his writing, December, 1868, nine plants were in existence, artificially propagated from the original one, besides five growing at the cinchona plantations at Darjeeling, to which place a cutting had been sent in 1867.

The "Indian Medical Gazette," on the authority of Mr. Clarke, now acting for Dr. Anderson, quotes the remarks of that gentleman:—"When I took charge of the Gardens, in 1869, there were seven plants, all under glass, and in a very low state of vegetation. The plant had been found to grow very slowly, and, moreover, to be very shy of propagation by cuttings.

"It is very possible that when the plant once gets up, it may not prove slow-growing, and that when we once have plants that seed, it may not prove slow of propagation; but I fear many days will elapse before any produce is likely to be obtained."—*Lond. Pharm. Journ.*, July 2, 1870, from *The Medical Press.*

ON THE COMPOSITION OF CHLORODYNE.

By Thomas Stretch Dowse, M.D.

It appears to me very unfortunate that the endeavors of gentlemen to elucidate the much-vexed question as to the composition of chlorodyne cannot be carried on through the medium of your Journal without giving rise to feelings so totally foreign to the subject. The displays of rhetoric by "A Provincial" are worthy of a different, if not a better cause. But I fear they will in no way tend to approximate and elaborate the evidence so kindly rendered by himself and others towards the solution of this controversy, and I do not think the remark uncalled for when I say that if this subject, which appears to be of some interest in a medical and chemical point of view, is to be associated with such feelings as were evinced in the letter of your last number, the sooner the discussion ends the better. It is not by such means that we shall be able in any way to arrive at a

definite result; and, after a careful survey of the correspondence which has been kindly permitted to occupy the pages of the "Pharmaceutical Journal," I am sorry to say, quite contrary though it be to the opinion of one of your correspondents, that the composition of Dr. Brown's chlorodyne is by no means cleared up. At the same time, before proceeding further, I must state that every respect and consideration ought to be paid to the careful chemical investigation of Mr. Smith,* which I consider, of all others, the most to be relied upon. Facta non Verba *versus* Verba non Facta; and, in making this remark upon Mr. Smith's formula, I do so upon the grounds that his analysis was carefully and skilfully conducted, and that his formula is based upon such investigation, that is, by the result of actual experiment, meaning by this *primâ facie* evidence. Although I credit this able analyst with using his best powers to arrive at the chemical composition of Dr. Browne's chlorodyne, —and doubtless he is absolutely correct as far as his analysis goes,—yet I feel persuaded there is something more in it which Mr. Smith has failed to detect, and I believe this to be belladonna. Mr. Smith frankly, and without reservation, admits that the positive detection and isolation of the alkaloids in complex organic mixtures is not always a very easy task, more especially when they exist in small proportions. And again, Mr. Smith states "all my attempts to obtain the evidence of atropia failed." Here, then, we have both positive and negative evidence. No one can doubt from his own assertion the inability of even a scientific analyst like Mr. Smith to discover the small traces of atropine which exist in a complex organic mixture like chlorodyne. How frequently has it been the case, in times past, that the analyst has been unable to discover the presence of strychnine in organic mixtures, when the physiologist has come forward, and rendered its existence indisputable by the tetanic action produced upon the frog! and the mere fact of the chemist being unable to detect atropine in chlorodyne does not for one moment destroy my belief in its presence, as I maintain that I have proved physiologically, beyond doubt, that belladonna is present. At all events, if I have not proved satis-

* See page 263 of the present volume.

factorily that belladonna does exist, there ought not to be a doubt in the mind of any accurate observer of the action of the alkaloids upon the nervous system but that chlorodyne even does contain a something, which modifies and changes the characteristic action of morphia which every one admits to exist in this compound, and which some believe to be its only active narcotic agent. As in my last letter I appeared to base my belief in the presence of belladonna principally from the effects observed in the case of poisoning there narrated, I will in this communication endeavor to show my experience concerning the action of chlorodyne both with and without belladonna. Dr. Kidd states positively that two preparations of chlorodyne are free from belladonna, if not all. But these bare and brief remarks, as a previous correspondent says, call for limited comment, so I shall pass them by. But I must have a word with your correspondent of last February, and try to meet him upon his own ground, as his reasoning is not only fallacious, but conspicuous for superficial observation. The following are some of his reasons for disagreeing with my *plausible* suggestion as to chlorodyne containing belladonna :—1st. He says, I have never known it, even in full doses, produce any result at all similar to the well-known effects of belladonna. Let me ask him what are the well-known effects of belladonna in ordinary doses? As far as my experience serves me—and I have been in the habit of prescribing this drug for some years—they are, dilatation of pupil, relaxation of muscular spasm, somnolency, vertigo upon first getting out of bed, and, when continued, impaired vision (certainly not contraction of the pupil). Has he never found any of these symptoms after a full dose of chlorodyne? Again, let me ask him, has he ever found contraction of the pupil after a full dose of chlorodyne, as he would most decidedly do, if, as he asserts, its active ingredient is nothing more or less than morphia? Or, again, has he carefully compared by clinical experience, as I have done repeatedly, a mixture of chlorodyne with and without belladonna? I most certainly think not. If so, he would have arrived at a conclusion rather different, as the following will prove. I took three chlorodynes, viz., Dr. Collis Browne's, one made according to Mr. Smith's form without

belladonna, and another with belladonna added. I selected three male patients with whom I found morphia to agree. They were not habituated to taking either chlorodyne or morphia, neither had they any organic disease. Such, I thought, fair subjects for notifying how far the symptoms produced by each were similar or dissimilar. First, I will commence with patient No. 1. To this man I gave thirty drops of chlorodyne prepared according to Mr. Smith's form. In half an hour he appeared drowsy, but did not sleep. There was slight headache and nausea. I therefore repeated the dose; in half an hour he was in a sound sleep. Upon awaking, which he did in seven hours after taking the second dose, his pupils were contracted to the size of a pin's head. No. 2. To this man I gave thirty drops of chlorodyne prepared according to Mr. Smith's formula, with the addition of the $\frac{1}{100}$th of a grain of atropine. In half an hour, or little more, he was in a sound sleep; and upon awakening, in three hours, his pupils were dilated. No. 3. To this man I gave thirty drops of Dr. Collis Browne's chlorodyne; and, as no sleep was produced in an hour's time,—only a feeling of stupor,—I gave him twenty drops more. In ten minutes he was in a sound sleep, and continued so for over five hours. When he awoke his pupils were unaffected (not contracted). The following day I reversed the order of things. To No. 1 I gave Dr. Browne's chlorodyne; no alteration of pupil (no contraction). To No. 2 I gave Smith's chlorodyne; the contracted pupil was well marked. To No. 3, Smith's chlorodyne with atropia; the pupils were *slightly* dilated. Hence, let me ask, what does this prove and impress upon the observer? First, that chlorodyne, without belladonna, does most unmistakably contract the pupil of the eye when given in a dose sufficient to produce sleep. Second, that chlorodyne with belladonna does not contract the pupil. Thirdly, that Dr. Browne's chlorodyne does not contract the pupil *when given in a sufficient dose merely to produce sleep.*

Again, with regard to the action of belladonna upon the pupil. If to a patient be given the $\frac{1}{60}$th of a grain of atropine, the pupil will be dilated in ten minutes. But if to this $\frac{1}{60}$th of a grain of atropine be added the $\frac{1}{8}$th of a grain of morphia, the pupil will

remain unaffected. In any case of poisoning by chlorodyne it was shown that the pupils were alternately contracted and dilated, the latter more so than the former, and so much so, that the iris was at times scarcely visible. As the effect of the dilating agent passed off, and the patient became comatose, the pupils became permanently contracted. This, to some extent, led me to the conclusion that morphia played the prime part in Dr. Browne's chlorodyne, its action being modified by belladonna, not the converse, as one of your correspondents suggests, belladonna modified by morphia. Again, your correspondent puts the question, Is it impossible that the joint action of morphia and hydrocyanic acid may have produced the symptoms described by Dr. Dowse? To this I cannot give an answer unless I make the experiment, but at present I have no desire to poison any one, however much it might further our views as to the composition of chlorodyne. This much, however, I can affirm most positively, that your correspondent may give ordinary doses of morphia and hydrocyanic acid for any length of time, and he will not by their conjoint action produce dilatation of the pupil. On the contrary, the pupil will be contracted until such time that the patient becomes so accustomed to its influence that it becomes inert. Again, your correspondent states, Finally, if this chlorodyne really contained any operative proportion of belladonna, I think this very decided drug would long since have proclaimed its presence there. Now, I object to this final assertion upon two points: first, that belladonna, in ordinary doses, is not the very decided drug your correspondent imagines; secondly, its action is so modified by morphia, that the usual effects are held in abeyance. And when, further on, he states, We have ascertained with positive certainty that there are present in Dr. Browne's chlorodyne only three ingredients of an active character, viz., morphia, hydrocyanic acid and chloroform; and again, when he states that Mr. Smith's formula, with the addition—may I say?—of a little caramel, will in all probability become the standard of chlorodyne throughout the British realm, I am not surprised when "Another Provincial" looks upon the language of your November correspondent as extremely tall. When he thus summarily disposes of the question, I am extremely sorry that I cannot agree with him, neither

can I understand how he arrives at such conclusion, unless it be from the analysis of Mr. Smith, which analysis, however perfect it may be, does not give us the composition of chlorodyne. And I cannot deny too emphatically the assertion of your correspondent when he says that Dr. Browne's chlorodyne is merely a disguised solution of morphia. In my former communication I stated my belief that Indian hemp did not enter into its composition. This I adhere to. I also stated that I thought it probable tobacco did so. This statement I will not retract, although I give it advisedly, as I have not noted sufficiently the physiological action of this drug. Yet, as I do not like to make a statement of this kind without a practical reason, I will suggest to your readers to test it in this way:—Place a drachm of chlorodyne in a small porcelain capsule, and expose it to the air at the ordinary temperature for twenty-four or thirty-six hours until the more volatile constituents have evaporated; then place the capsule in a sand-bath at a temperature of 140° F., when a tobacco-like odor will be emitted. By way of experiment, let him try a drachm of chlorodyne according to Mr. Smith's formula, and the result will be dissimilar. Lastly, I beg to state that the addition of belladonna to Mr. Smith's formula will give results, both therapeutical and physiological, similar to Dr. Collis Browne's chlorodyne.

In this communication I might have entered more fully into the symptoms of those patients upon whom I experimented, but I have tried to deal with the clearing up of this matter in a clear and *practical* manner. The form that I have adopted for some time past is as follows:—

℞	Belladonnæ Extracti	ʒij
	Morphiæ Muriatis	gr. xxx
	Ætheris Rectificat	f ℥viij
	Chloroformi	f ℥viij
	Acid. Hydrocyanic. dil. . . .	f ʒiv
	Olei Menthæ Piperitæ . . .	gtt. xxx
	Capsicine	gr. vj
	Misturæ Acaciæ	℥xx
	Caramel	ʒj
	Theriacæ	ad ℥lx

M. s. artem.

Whether Dr. Browne's chlorodyne contains more or less than is represented in the above formula I cannot say, neither do I attempt to assume decsively upon this point. Of course it is possible, although I deem it improbable, that it may contain some subtle ethereal compound undetected by either chemist or physiologist; and, although my formula contains belladonna, —thus differing from Mr. Smith's,—I am quite sure that the fair, impartial, and accurate clinical observer must feel assured that chlorodyne, prepared according to Mr. Smith's formula, *does contract the pupil*, thus differing from Dr. Collis Browne's; that chlorodyne, prepared according to my formula, *does not contract the pupil*, thus agreeing in its action with Dr. Collis Browne's; these observations applying only to ordinary doses. —*Pharm. Journ., Lond., June* 15, 1870.

Medical Club, May 16*th*, 1870.

ON FERMENTATION.

By Mr. James Bell.

A series of experiments has been instituted, and is still in progress, to determine the forms of natural ferment which albumen, derived from different sources and under various conditions, will give rise to.

Albumen of eggs was introduced into a cane-sugar solution, and the mixture allowed to ferment at a temperature of 75° F. Fungoid cells, different from those of yeast, were formed, and possessed of very little fermentative power, inasmuch as only 0.2 per cent of alcohol were produced in this sample.

Albumen of flour and malt, in a cane-sugar solution, gave rise to the development of a fungoid mycilium, and consequent production of cells and spores similar to those obtained by albumen of egg. These, too, were of very little fermentative power. The albumen in this case was prepared by coagulation, and then by precipitation. When albumen of the first kind was brought into the sugar solution, the liquid very soon contained parasites, and became rapidly acid. If albumen obtained by precipitation with alcohol was employed, the solution, even after a week, was free from parasites, and also of acidity.

Cold water extracts of flour and malt were added to cane-sugar solution, which also contained some glucose. The extract, on addition of sugar-cane, was converted into mucilage; and the change is permanent in flour-extracts, but extracts of barley-meal possess great power to produce the yeast-cells, which act upon the mucilage, and resolve a portion of it into alcohol and carbonic acid. The developement of the yeast cells in the mucilage is a most interesting sight: the cells, as they multiply, are prevented from separating, on account of the thickness of the solution, and thus remain clustered together.

Cold water extracts of grain abound with microscopic parasites, which soon set up a strong action, thereby giving rise to the production of acid, and doubtless, also, to the transformation of the cane-sugar into mucilage. Boiling destroys these parasites, prevents in a great measure the production of acid, and subsequently yields more alcohol. This conclusion was arrived at after many and varied experiments.

When "pus" was employed as ferment, a fungoid organism, similar to that obtained by albumen from flour and malt, was developed in the solution, which likewise possessed very little fermentative power.

The fermentative properties of two moulds, the blue mould from moist malt, and the mould from lemon-juice, were next investigated in a glucose solution. Both proved good ferments.

In order to compare the relative fermentative power of the yeast-plants of malt and the grape, the following experiments were instituted:—

To a solution capable of giving 16 per cent. alcohol, brewers' pressed yeast was added successively. The limit was reached on the sixteenth day; but the experiment was carried on for upwards of thirty days, when the alcohol in the liquid amounted to 15.91 per cent. When the extreme point was reached, the yeast-cells became contracted and shrivelled; but, when they were transferred to a fresh sugar-solution, they recovered their vitality. In several cases, glucose was added to the cane-sugar solution: and it was here observed that, in the presence of an excess of glucose, comparatively less alcohol was obtained: the alcohol and glucose combined seemed to act as an antiseptic.

To the must from English hot-house grapes a known quantity of glucose was added, and the liquid, together with the greater part of the husks, was left to ferment at 65° F. The fermentation ceased in about twenty-three days. Another sample was permitted to ferment at 75° F.; and here all action ceased on the sixteenth day. To a third sample such amount of glucose was added as to bring the glucose naturally existing in the juice up to 40 per cent. In this case, the beginning of the fermentation was delayed much beyond the usual time; and the quantity of alcohol obtained was less than in a case where less glucose had been added.

In all cases the wine-ferment proved to be of greater fermentative power than the malt ferment.

From all these experiments Mr. Bell deduces the conclusion that it would be advantageous to add to grape-juice some glucose, so as to assist the exhaustion of the must of its fermentative element, and to impart thus to the wine a greater keeping-power. In some instances the fermentation was started in the grape-juice by brewers' yeast: the amount of alcohol here obtained was less than in the cases where the action was caused by the natural ferment of the grape-juice.

Finally, Mr. Bell instituted some experiments to ascertain the influence of change of soil; and the results in connection with the observations made in some of the above experiments lead to the inference that the various ferments have their favorite soils.

The PRESIDENT, in asking the Fellows to vote their thanks to the author, gave a brief *resumé* of the state of knowledge we at the present day possess of the yeast-plant. Though called a "plant," the yeast organism appears in all its functions rather animal than vegetable. The products of its secretion are less complicated than those it takes in. It does not, like plants, require light for its vital process; neither does it absorb heat, but, on the contrary, gives such off. Prof. Williamson then, alluding to Leibig's recent memoir, observed that this distinguished chemist has entirely dropped his ancient notions regarding fermentation, though he somewhat successfully criticised some of Pasteur's statements.—*Proceedings of Chem. Soc., in Chemical News, London*, June 24, 1870.

ON ORGANIC MATTER IN WATER.

By Dr. Heisch.

The author was, some time ago, called on to assist a large manufacturer of lemonade, who suddenly found it impossible to make lemonade that would keep; after a day or two it became turbid, and its odor anything but agreeable. On examining the liquid under the microscope, it was found full of small spherical cells, with, in most cases, a very bright nucleus.

After investigating all the materials employed, the water was detected to bear the fault. On putting a few grains of the purest crystalline sugar into some of the water, it became turbid in a few hours, and contained the cells previously described.

On inquiry, Dr. Heisch found that some digging had been going on in the neighborhood of the well from which the water came; and that, through this circumstance, some drainage must have got into the well. This led the experimenter to try various samples of water in the same manner; and, in every case where diarrhœa or other mischief could be traced to the use of a certain water, when that water was treated with sugar, the same cells made their appearance usually within twenty-four hours, if kept at 60° to 70°, and plenty of light was admitted to the bottle containing the fermenting liquid.

Believing sewage to be the source of these cellular germs, Dr. Heisch mixed a minute quantity of sewage with a sugar-solution which had been previously ascertained to be free of cells, and found the solution very soon to contain these germs. A number of experiments were made to find out whether other substances than sewage or sewage-water were capable of producing organisms of similar kind when placed into a sugar-solution; but, though in a few cases some growths were produced, they never resembled the cells originated by sewage. In all the experiments with sewage, where the particular cells made their appearance, a butyric odor also was perceptible. Filtering the water through the finest Swedish paper does not remove the germs. Boiling for half an hour in no way destroys their vitality. Filtration through a good bed of animal charcoal seems to be the only effectual mode of removing them; but it is necessary to air the charcoal from time to time, else it loses its purifying power.

The author is at present engaged to ascertain what substances are capable of retarding or preventing the development of these germs. As to the conclusions derived from the above observations, Dr. Heisch thinks that wherever the described germs occur in water they are distinct evidence of sewage-contamination.—*Proc. Chem. Soc., in Chem. News, June* 24, 1870.

DOUBLE SULPHIDE OF POTASSIUM AND IRON.

By Professor Morton.

By heating an intimate mixture of 5 parts of sulphur, 5 of potassic carbonate and 1 part of fine iron filings, C. Preiss has succeeded in forming a double sulphide of potassium and iron, which crystallizes in red needles, has a metallic lustre, and resembles in appearance potassic permanganate. Its formula is KS, FE_2S_3.* The same compound has been obtained independently by R. Schneider, who also has formed, by the replacement of iron by bismuth, the analogous compound, KS,Bi_2S_3.—*Pogg. Ann., from Chem. News, Lond., June* 17, 1870.

THE ENGLISH COMMERCIAL SODA TEST.

To the Editor of the Chemical News:

Sir,—My attention has lately been drawn to a strange error made by some analysts in attempting to apply the English commercial test for soda to samples of alkali, soda-ash, &c., the result of which error is to make the test indicate from 1 to 1½ per cent. more soda than the sample contains by the proper English test. It is well known that this (the English soda-test) had its origin in the early days of the soda trade—when chemists believed the equivalent of soda to be 32, and that of carbonate of soda 54; and that, consequently, test acid was made so that 40 parts of sulphuric acid neutralized 54 parts of carbonate of soda, equal to 32 of soda. This method of testing has always been and still is used by the soda trade throughout England, and it is a custom well understood by both buyers and sellers. It indicates 0·66 per cent. more soda in a 50 per cent. alkali than the rigidly correct test based on the new equivalent 31 would

* Journ. f. Prakt. Chemie, cvii, p. 10.

indicate. It is certainly desirable, for the sake of scientific accuracy, that the correct equivalent, 31, should be used in testing; but, seeing that manufacturers have expended their capital in plant, and made their contracts for their various materials on the understanding that a product containing a certain percentage of soda would be obtained, and, seeing that there are other commercial customs of the trade still in force, which tell as much against the manufacturer as the test does in his favor—such, for instance, as that of not charging for fractions of percentages—it is more the province of an association like the Alkali Manufacturers' Association, than that of an analytical chemist, to make alterations in trade usages affecting such vast interests. Certainly, if any alteration be made at all by chemists, it should be made in the direction of scientific accuracy, and not in the contrary direction, as in the case to which I have referred. The error, I find, arises in this way: The test-acid is made so as to indicate the exact amount of soda according to the new and correct equivalent, 31—that is, that 40 parts of sulphuric acid should neutralize 53 parts of carbonate of soda, equal to 31 parts of soda.

To convert the results obtained by this test acid into the English commercial soda-test, it is incorrectly assumed that the 31 parts of soda are equal to 32—in other words, that the 53 parts of carbonate of soda contain 32 parts of soda. This is where the error lies; for, according to the correct English test, 54 parts of carbonate of soda, and not 53, contain 32 of soda; and, therefore, by the English test, 53 parts of carbonate of soda contain only 31·41 of soda. By thus mixing up the old and the new systems of equivalents, a sample of soda-ash which, by the correct English test, contains 50·66 per cent. would be returned as containing 51·61 per cent. of soda. A sample of caustic soda which, by the correct English test, would contain 75·0 per cent. of soda would, by this erroneous method, indicate 76·4 per cent. It is only necessary to point out this error in order that it may be avoided and guarded against by any of your readers interested in the buying and selling of alkalies.

I am, &c., JOHN PATTINSON.

Newcastle-upon-Tyne, June 7th, 1870.

—*Chem. News, Lond., June* 17, 1870.

ASHY CROWN CINCHONA IN VENEZUELA.

Dr. Ernst, the President of the Society of Natural and Physical Sciences of Caracas, has rediscovered the *Cinchona cordifolia*, Mutis, var. *rotundifolia*, Weddell (*C. rotundifolia*, Pavon), in the neighborhood of Caracas, a specimen having been collected in 1829 by Dr. Vargas in the same place.

In an excursion made by Dr. Ernst, the trees were found in groups on the slopes of Papelon, Anauco, Galipan, etc., at an elevation of 4500 feet above the sea-level. The trees were covered with lichens (the *Graphis sulcata*, DC., being particularly noticed), and the largest of them had a circumference of 83 centimetres. The same tree is said probably to occur in Mariches, from whence small quantities of bark were collected for exportation some time ago. The bark of this tree is known in commerce as Ashy Crown Bark, one of the Loxa or Crown Barks, and occurs in quills. From an analysis made by Senor Vicente Marcano, a member of the same society, 60 grammes of this bark yielded 3 decigrammes of quinine, and 4 decigrammes of cinchonine. The bark, however, was collected at the wrong season.

From Port Cabello another bark, known as Quina Maracaibo, is exported. This is the produce of the *Cinchona Tucujensis*, a tree growing only to the height of 12 to 15 feet, which is found in the forests surrounding the colony of Tovar. In the same forests are found *Cinchona* (now *Buena*) *Henleana* and *Moritziana* of Klotzsch.—*Vargasia: Boletin de la Sociedad de Ciencias Fisicas y Naturales de Caracas, No.* 7, 1870, *from Pharm. Jour., Lond., July* 23, 1870.

TETRABROMIDE OF CARBON.

At a recent meeting of the Chemical Society, the discovery of the tetrabromide of carbon was announced by Messrs. Bolas and C. E. Groves. This compound is obtained by several processes: (1) by heating bisulphide of carbon in a sealed tube with bromide of iodine; (2) by digesting bromopicrin (CB_3NO_2) with bromide of iodine in a flask furnished with a condensing

tube; (3) by heating bromoform ($CHBr_3$) with bromide of iodine in a sealed tube. The product is obtained in a pure state by distillation. It is a white substance, crystallizing in plates, melting at 91° C., of an ethereal odor, somewhat resembling that of tetrachloride of carbon, and sweetish taste. It is not soluble in water, but dissolves in ether, alcohol, bisulphide of carbon, chloroform, bromoform, benzol, and American oil. Sodium amalgam reduces it to bromoform, and then into dibromide of methylene.

This interesting body belongs to the group which has yielded nearly all our anæsthetics, and it will be seen, on inspecting the tabulated arrangement below, that there is now but one member missing, to be supplied, we may safely hope, by future research. The tetriodide of carbon is the body which yet remains to be found to complete the series.

	Chloride.	Bromide.	Iodide.
Methyl . .	CH_3Cl	CH_3Br	CH_3I
	Dichloride.	Dibromide.	Diniodide.
Methylene . .	CH_2Cl	CH_2Br_2	CH_2I_2
	Trichloride.	Tribromide.	Tri-iodide.
Formyl . .	$CHCl_3$ (Chloroform.)	$CHBr_3$ (Bromoform.)	CHI_3 (Iodoform.)
	Tetrachloride.	Tetrabromide.	Tetriodide.
Carbon . .	CCl_4	CBr_4	CI_4 (Missing.)

—*Lond. Pharm. Journ., June* 15, 1870.

LIME JUICE.

A superior quality of lime juice has been lately imported into this country by Messrs. Evans, Lescher & Evans, which is prepared on the plantation of Sturge's Montserrat Company. This juice seems to keep clear and bright without any addition of spirit or any chemical agent, and it is of very excellent flavor. We have learned the following interesting particulars of the island of Montserrat, and of the cultivation of the lime tree there, from the consignees: [Geographical notice omitted.]

The lime tree, a native of Western Africa, seems early to

have found a congenial *habitat* in Montserrat. In the autobiography of a negro, who obtained his freedom about the year 1750, he mentions his first profitable adventure, as consisting in trading in this fruit to the neighboring islands. The tree, however, has never been made an object of extended and systematic cultivation till within the last twenty years. Its form is that of a large Lauristina bush, spreading in some instances over the ground for twenty to thirty feet; its foliage is like that of the myrtle, but with leaves of brighter green. It is armed with sharp thorns, making it often difficult to gather the fruit from the interior of the tree. The blossom is smaller than that of the orange, with a powerful fragrance. The crop is principally gathered in the months commencing with July and ending with February, the trees often displaying at the same time the blossom and the ripe limes, with the green fruit in all its intermediate stages of growth.

The plantations range along the shore for about two miles, extending in one direction to about 1500 feet up the mountain steeps, with space between the trees to admit of the pasturage of cattle among them.

During the season of crop, the fields are traversed by a large company of young negroes, with a woman superintending them, who gather the ripe fruit into wide open baskets. When these are all filled, they are taken direct to the presses at the boiling houses, and the large company of "little people," as they are termed, proceeding with quick step in long Indian file, with the bright yellow fruit on their heads contrasting with their dusky figures, now lost among the lime trees, now emerging into the open path, presents to the stranger a curious and novel spectacle unique in its kind.

So the fruit, on its reaching the works, is passed through a machine driven by the mountain stream, which cuts it into slices, when it is transferred to the presses for the expression of the juice, which is then evaporated to about the consistency of honey for the manufacture of citric acid.

When, however, it has to be shipped as fresh juice, the fruit is first carefully sorted, and the unripe or over-ripe limes rejected, and when transferred to the presses, only about two-

thirds of the juice is pressed out for this purpose; it being found that the last portion resulting from extreme pressure is of diminished strength and quality. This purer juice, being run from the presses at once into casks, is immediately secured from the air, so as not to be opened till its arrival in England.

The lime tree requires a period of from seven to ten years from the time it is planted before it makes any considerable return in fruit.

Montserrat, like the adjoining islands, is occasionally visited by earthquakes. In that of 1843, occurring in dry weather, the large quantity of rocks and boulders detached from the mountain summits enveloped them in such an atmosphere of dust, that the captain of the inter-colonial mail steamer, passing at the time, reported that the island had, in the convulsion, sunk under the ocean.—*Chem. and Drug., Lond., June* 15, 1870.

SNAKE POISON AND ITS ANTIDOTE.

The following communication appears in a recent issue of the *European Mail*, and throws an important new light on the therapeutics of animal poisons:

Sir,—Having noticed of late the publication in both European and American journals of articles upon the subject, and particularly one under date March 2, 1870, under the heading, "The Cobra Question in India," I trust you will give publicity to this communication, on account of its importance; and am induced to ask for it a place in the columns of your journal, in the hope that it will afford to your readers, in India more particularly, a knowledge of an antidote for snake poisons, which may claim to be specific, insomuch as it has never been known to fail in a single instance during the past three years in different districts in this country, in which I have been able to induce its general adoption, and particularly by the *curanderos*, or curers (snake charmers). I have devoted no little time during the past twenty years to a study of the habits, peculiarities, &c., of poisonous snakes, and have made many experiments with their poisons, with a view to discover, if possible, specific antidotes to them, and have been so far successful as to be able to announce the

law in therapeutics that "all animal poisons have their specific antidotes in the gall of the animal or reptile in which these poisons exist."

The bite of the *cobra*, or of any other poisonous snake or reptile, can be cured by administering a few drops of a preparation of the gall of the *cobra*, which should be prepared as follows: Pure spirits of wine, or 95 per cent. alcohol, or the best high wines that can be procured, 200 drops; of the pure gall, 20 drops; in a clean two-ounce phial, corked with a new cork; give the phial 150 or 200 shakes, so that the gall may be thoroughly mixed with the spirits, and the preparation is ready for use. In case of a bite put five drops (no more) of the preparation into half a tumblerful of pure water; pour the water from one tumbler into another, backwards and forwards several times, that the preparation may be thoroughly mixed with the water, and administer a large tablespoonful of the mixture every three or five minutes until the whole has been given. In case the violence of the pain and hæmorrhage or swelling of the bitten part should be but slightly alleviated after the whole has been taken, repeat the dose, prepared with the same quantity of the preparation in the same way, and administer as before. In curing upwards of fifty cases of snake bites I have never been obliged to repeat the dose except in two instances, and have never lost a case. The *cobra* poison is no more deadly than that of a great variety of snakes found in South America, of which may be named the *Cascabel*, or *Rattlesnake; Boqui-dorada*, or gilded mouth; *Mapana-sapo*, or frog-headed Mapana; *Mapana-fina*, or *Lachesis*, *Niger*, *Birri*, and *Verrugosa*, or wart snake. The poison of all these varieties produces death (under certain conditions—atmospherical, physical, climaterical, and electrical) in from fifteen minutes to two or three hours; but it is found that the gall of each variety (administered as previously indicated) is the perfect antidote for its own poison. The gall of the most deadly kind may be used in cases of bites of those less virulent, and is also applicable in cases of bites of the centipede, scorpion, stingray, star-lizard, or *Lacerta stella*, and is also very effective in dog-bites. The native curers use a tincture of a plant called *Alconcito*, or *solobasta*, for bites of the *Cascabel* and *Boqui-dorada*,

with very good success in cases of bites, and also as a prophylactic, by inoculation (in the point of the shoulder), for preserving themselves harmless against these poisons. For this purpose incisions are made at the lower point of attachment of the deltoid muscles, in the same manner as for vaccination, and into these are introduced small pellets of cotton (of the size of a millet seed) saturated with an alcoholic tincture of the *Alconcito.* Care is taken to keep within doors and out of the wet and dew for from fifteen to twenty days, after which period the inoculation is concluded. Of the efficacy of this process, I can say that I have repeatedly tested it on dogs, in a district where every dog not inoculated, if bitten by a snake, invariably dies, and have never known an inoculated dog to show any inconvenience from the bite of the most venomous viper. This plant is the *Aristoloquia Colombiana.* In Brazil the curers use the tincture of the *Aristoloquia milhomeus*, or *Arist. grandifloras.* In the United States the Indians use the *Serpentaria*, or *Aristoloquia Virginiana*, and it is more than probable that the *Arist. Colo.*, or the *grandifloras*, is to be found in India.

During my research in this branch of natural history I have collected much interesting and valuable information, all of which I have incorporated in a small work that will shortly be published in English; but the reports of such a frightful number of deaths from snake bites as English journals record as having occurred during the past year in certain parts of India, have led me to address this letter to you, that the truth of the efficacy of this antidote for snake bites may be tested by every person who takes any interest in the matter, and that these tests may be so effectually made that a point of such vital importance as the discovery of the specific antidote for these poisons may be known throughout the world.

I indulge the hope that I may see repeated corroborations of the results of my own humble labors in this specialty through so many years.

Your obedient servant,

S. B. Higgins.

State of Magdalena, April 10, 1870.

—*Chem. & Drug., Lond., June* 15, 1870.

CHLORAL.

By C. A. Martius and P. Mendelsohn-Bartholdy.

In the course of our experiments on the preparation of hy drate of chloral, it fell in our way to examine different preparations found in commerce, the purity of which was guaranteed by crystallization from sulphuret of carbon and ether, and subsequent pressing out. Our attention was also directed to the varying statements respecting the points of fusion and ebullition of hydrate of chloral, and to the possibility of admixture of foreign substances, even after the renewal of free chlorine and hydrochloric acid, and notwithstanding its solubility and apparent homogeneity; and that to these foreign substances might be due the discrepancies relative to physical properties, and possibly also the physiological discrepancies found by different observers. We were especially struck by the differences in boiling-point in different preparations, and led to the preparation of a series of compounds which threw light upon these discrepancies, and which are, moreover, of some scientific interest.

It had been observed by J. Personne* that chloral enters into combination with alcohol just as it does with water. According to our observations, the other alcohols of the fatty series behave similarly to ethylic alcohol. When one equivalent of chloral is mixed with one equivalent of anhydrous ethylic alcohol, there is union accompanied with development of heat, and, on cooling, the resulting compound solidifies into a crystalline mass. The same takes place when methylic, butylic, or amylic alcohol, or mercaptan, is substituted for ethylic alcohol.

We may regard these compounds as intermediate trichloracetals.

Acetal.

$$CH\left\{\begin{array}{l} CH_3 \\ OC_2H_5 \\ OC_2H_5 \end{array}\right.$$

Trichloracetal.

$$CH\left\{\begin{array}{l} CCl_3 \\ OC_2H_5 \\ OC_2H_5 \end{array}\right.$$

Chloral-hydrate.

$$CH\left\{\begin{array}{l} CCl_3 \\ OH \\ OH \end{array}\right.$$

Chloral alcoholate.

$$CH\left\{\begin{array}{l} CCl_3 \\ OH \\ OC_2H_5 \end{array}\right.$$

Chloral amylate.

$$CH\left\{\begin{array}{l} CCl_3 \\ OH \\ OC_5H_{11} \end{array}\right.$$

Chloral mercaptide.

$$CH\left\{\begin{array}{l} CCl_3 \\ SH \\ OC_2H_5 \end{array}\right.$$

* "Comptes Rendus," vol. lxix, p. 1363.

Inasmuch as the production of these compounds takes place without formation of any bye-products, analysis of them appeared to be unnecessary. We have, however, taken the vapor-densities of some of them, and found that, like chloral-hydrate itself, they have only half the condensation indicated by their formulæ.

With the *ethers* of the alcohol-radicals chloral does not combine. The compound of chloral and ethylic alcohol boils at 115° to 116° C., and solidifies at 40° C., becoming crystalline. At 40° C. (in the fluid condition) its sp. gr. is 1·143.

In cold water it dissolves only slowly, but on warming, the solution is complete. In ether, alcohol, acetic ether, and petroleum, it is easily soluble; and on cooling the hot concentrated solution, it crystallizes out in long beautiful needles.

The methylic compound resembles the ethylic compound very closely. It boils at 98° C.

The amylic compound boils at 143° C., and at 25° C. has a sp. gr. of 1·2340. At 25° C. it solidifies to a crystalline mass, which is soluble in ether, alcohol, and petroleum. From the last-named solvent it is capable of crystallizing in long tufts of needles. Only on prolonged boiling with water is the decomposition into chloral and amylic alcohol complete.

Chloral-mercaptide, chloral, and mercaptan combine with great evolution of heat, and form a crystalline compound, soluble in ether, alcohol, sulphuret of carbon, and capable of crystallizing easily out of its solutions in these solvents.

We can easily understand that the alcohol-compound has been often taken for the hydrate of chloral, and that the hydrate has been often contaminated with the alcoholate.

It appears to us to be especially interesting to study the physiological characters of the alcohol-compounds; according to O. Liebreich, the physiological effects of the alcoholate differ essentially from those of hydrate. In preparing the hydrate for medicinal use, one of the main points to be attended to is its freedom from alcoholic compounds. Pure hydrate of chloral boils at 95° C., as we have ascertained by numerous experiments.—*Pharm. Journ., July* 30, 1870, *from Buchner's* "*Repertorium für Pharmacie,*" 1870.

CHEMICAL EXAMINATION OF SEVERAL SORTS OF CONDENSED MILK.

By L. Kofler.

The following samples, examined by the author, were exhibited at the Agricultural Show at Schwarzach :—

I. From the Anglo-Swiss Condensed Milk Company, in Cham, Canton Zug; in air-tight tin boxes containing one pound.

II. From the manufactory at Sassin; in square glasses.

III. From the German-Swiss Milk Extract Company, at Vivis and Kempten; in glass vessels.

IV. The same; in tin boxes.

For the purpose of comparison, a similar preparation was made with milk that had been examined during twelve days previously, with the following results :—

	Specific gravity.	Amount of Cream.
15 October	1·034	13
16 "	1·036	13½
17 "	1·040	14
18 "	1·034	13
19 "	1·034	13½
20 "	1·034	13
21 "	1·035	12
22 "	1·033	12
23 "	1·034	13½
24 "	1·036	12
25 "	1·035	15
26 "	1·033	15
Mean results	1·035	13·1

This preparation was marked V., and underwent the same examination as the other samples.

Determination of Water.—By drying until the weight remained constant.

Determination of Fat was made by extraction with ether, until the residue examined under the microscope presented no fat globules.

Determination of Casein and Albuminous Material was made by slightly acidifying with acetic acid at a gentle heat, filtering, and drying.

Determination of Salts by incineration. The further examination of the ash showed that it contained, like the ash of pure cow's milk, upwards of 40 per cent. of phosphates, and that one-half consisted of potash, soda, lime, and sulphates.

The amount of sugar in the samples varied between 25 and 30 per cent.; the amount of milk sugar, between 14 and 18 per cent.

The following table gives the general results:—

Constituents.	I. Cham.	II. Sassin.	III. Kempten.	IV. Kempten.	V. Standard.
Water . . .	22·180	18·824	22·421	18·810	20·770
Fat	12·260	12·625	12·030	13·650	12·830
Caseine and Albumen	28·100	24·240	25·960	24·900	29·600
Ash	2·180	2·482	2·673	2·430	2·865

All of these samples, dissolved in four or five times the volume of water, furnished milk which in appearance and taste perfectly resembled fresh boiled milk, except that it was sweet, owing to the admixture of sugar.—*Pharm. Journ., July* 30, 1870, *from Vierteljahresschrift für Praktische Pharmacie.*

A SIMPLE, CHEAP AND EFFICIENT SUBSTITUTE FOR THE STOMACH PUMP.

By John T. Hodgen, M.D.,
Professor of Anatomy, Saint Louis Medical College.

About a year ago, I had a case of stricture of the œsophagus so narrow that my patient could not swallow even liquids. To sustain life I resorted to a small stomach tube (a gum catheter, in fact), as a means of injecting liquid nourishment; to this I fixed the elastic tube of one of Davidson's syringes.

On one occasion the vessel containing the liquid happened

to be higher than the patient's stomach, and I observed while the syringe was not being used, that the liquid continued to flow into the stomach—the action being that of a syphon. I at once, to test the syphon, substituted a simple elastic tube for the syringe, and found the stomach could be as readily emptied as filled. Thus I conceived the idea of using a syphon instead of a stomach pump, and have used the same in a case of poisoning recently with the most complete success.

I attach four feet of india rubber tubing to a stomach tube, fill both with water by simply dipping it in the liquid end first, then compressing the elastic tube between the thumb and finger to keep the fluid from running out, introduce the stomach tube, lower the outer end of the elastic tube, and the contents of the stomach pour out as readily as if from an open vessel. When the fluid ceases to flow, I dip the outer end of the tube beneath the surface of water, elevate the vessel containing it, and the stomach is soon filled; lower again the outer end of the tube and the stomach is emptied. This can, of course, be repeated as often as is necessary.

The advantages claimed for this simple contrivance are, that it may be almost always improvised, is of speedy and easy application, has no valves to become obstructed or deranged, and is less expensive than a stomach pump.

The same principle may be applied in injecting fluids into the bowels, as indeed it has been for injecting into the bladder, uterus and vagina.—*Bost. Med. and Surg. Journ., August* 11, 1870, *from St. Louis Med. and Surg. Journ.*

PALM OILS OF COMMERCE.

By P. Guyot.

Palm oil is obtained from the fruit of the *Avoira* or *Crocro* palm-tree, growing on the coast, and also in the interior of Guinea. It yields two kinds of oil—viz., a white-colored, butter-like substance, extracted from the kernel of the fruit, and chiefly used by the natives as food; the point of fusion of this oil is stated to be rather high. The other kind is extracted from the fibrous sarcocarpon surrounding the fruit; at the prevailing

temperature of its native country, this oil is fluid, but in Europe it has the consistency of butter; its color is yellowish orange, and its smell is very much like that of violet flowers; it is insoluble in cold as well as boiling water, slightly soluble in alcohol, and very soluble in ether. The author gives, in a tabulated form, the results of the action of different reagents upon the oil alluded to, and some of the commercial varieties thereof, as imported from other countries where the oil is obtained either from the same or some other kind of palm-tree. The action of the reagents alluded to (sulphuric and nitric acids, ammonia, chloride of zinc, protochloride of tin, pernitrate of mercury, and liver of sulphur) is not sufficiently characteristic to be specifically quoted here; and this is the less necessary because, as the author also states, adulteration of these oils would not be practised in the country whence they are exported, and certainly not in Europe, unless it were done in a very wholesale manner, and with the application of very inferior fats. The complete solubility in ether is a sufficient test of purity; the coloring matter is readily destroyed when desired.—*Chem. News, June* 24, 1870, from *Mon. Sci.*

ON CYCLOPIC ACID, A NEW FLUORESCENT SUBSTANCE EXTRACTED FROM THE *CYCLOPIA VOGELII.**

By Arthur H. Church, M. A. Oxon, F. C. S.

One of the plants used by the African Boers, for tea, is the *Cyclopia Vogelii.* Endeavoring to extract theine from the dried leaves and flowers of this plant, I met with a substance apparently new to science, and possessing one remarkable property, that of a high degree of fluorescence. This character is best seen when a crystal or two of the new body is dropped into a solution of caustic soda and viewed in sunlight. An intense greenish yellow fluorescence is perceived at first, but disappears in the course of some hours.

I have named the new substance *cyclopic acid.* It is extracted by enclosing a pound or so of the dried leaves in a cloth, and immersing this for some days in water at about 30°—40° C., occasionally squeezing the cloth. A yellow powder gradually

* Communicated by the Author. From the Report of the Chemical Department, Royal Agricultural College, Cirencester.

accumulates at the bottom of the vessel of water, and should be dissolved in a mixture of ether, alcohol, and water, acidified with a drop of acetic acid. By two or three re-crystallizations rom weak alcohol, the cyclopic acid is obtained pure. It contains only carbon, hydrogen, and oxygen; different samples gave closely accordant results on analysis:

	Percentages of Carbon.	Percentages of Hydrogen.
1.	53·43	5·78
2.	53·58	5·92
3.	53·40	5·13
4.	53·36	5·62

These numbers correspond pretty fairly with the formula $C_7H_8O_4$, which demands the following percentages:

Carbon,	53·84
Hydrogen,	5·13
Oxygen,	41·03
	100·00

The formula, $C_7H_8O_4$, is rendered more probable by the result of neutralizing cyclopic acid with a standard solution of ammonia. The formula indicated for the ammonium cyclopate thus produced was $C_7H_6[NH_4]_2O_4$.

It is possible, however, that cyclopic acid contains more hydrogen than assumed above, in which case it would have the formula $C_{14}H_{18}O_8$, and its ammonium salt be $C_{14}H_{14}[NH_4]_4O_8$.—*Chem. News, Lond., July* 1, 1870.

EFFECT OF BISULPHIDE OF CARBON ON WOOD.

Bisulphide of carbon, according to Sidot, renders wood very sonorous, and makes it an excellent conductor of heat and electricity. Sidot passed vapors of bisulphide of carbon over pieces of wood in a porcelain tube, first in the cold, in order to expel the air, and then at high temperature, the tube being slowly and gradually heated for an hour until it was red-hot. The various kinds of wood yield, by this treatment, a coal which is not surpassed by the most sonorous substances known. Sidot made a bell of oak wood, and subjected it to this treatment with bisulphide of carbon. The sound it gave after the process compared

favorably with that of a metallic bell of equal diameter. The hardest kinds of wood seem to produce the purest and most harmonious tones. On account of its capacity of conducting heat and electricity, Sidot recommends the coal prepared in this manner for use in Bunsen's galvanic batteries, and for pencils for the electric light. Such pencils give a much intenser light than those made from the graphite of gas retorts; they become gradually white-hot throughout their whole mass, without burning at a single point, and cool down immediately as soon as the fire is removed. Linen, hemp, cotton, paper, and silk behave similarly to wood, and the action of methylated spirits (wood naptha), hydrocarbons, &c., resembles that of bisulphide of carbon. The coal from wood has superficial metallic lustre, is denser than common charcoal, and has a greater absorbing power for gases. —*Pharm. Jour., Lond., July* 2, 1870, *from Journal of Society of Arts.*

CULTURE AND DISEASES OF THE SILKWORM.

Pasteur has recently investigated some of the diseases which attack the silkworm, and has published the results of his labors in a work entitled "Sur la Maladie des Vers à Soie." The disease, called pébrine, which has been very prevalent and destructive of late years in various parts of France, has especially engaged his attention

Pébrine derives its name from the black specks which occur on the silkworm suffering from it, and it consists in the development of peculiar parasitic corpuscles which invade the eggs, the blood, and all the tissues of the silkworm. One of the observations of M. Pasteur is, that the corpuscles are very easy of detection in the moth of the silkworm, whilst in the earlier stages of silkworm development, *i. e.* in the stage of the egg and of the worm, the detection of the pébrine corpuscles is difficult and often impossible.

Moths which are recognized as sound, produce sound eggs, whilst unsound moths produce unsound eggs, which, although themselves showing no sign of the disease, cannot develop into healthy worms.

Pasteur's practical advice to the silk cultivator was to examine the moth, and to make sure that healthy moths were started

from. The mode of procedure in vogue before Pasteur's investigation of the subject was to examine the eggs. Pasteur remarks, that the culture of the silkworm ought to become a profitable industry in many of the colonies of Great Britain.—*Pharm. Journ., Lond., July* 16, 1870.

NEW METHOD OF HEATING STONEWARE VESSELS, AND OF OBTAINING REGULATED HIGH TEMPERATURES.

In conducting chemical and pharmaceutical operations for manufacturing purposes, it is generally necessary to effect evaporation and distillation in stoneware vessels; but great difficulty has been hitherto experienced in obtaining a sufficiently high temperature without cracking or breaking the pan employed. The use of a naked fire inevitably causes a fracture; and a sand bath offers too great an obstruction to the passage of the heat. With a steam-jacket, it is impossible even to raise water to the boiling point, unless, indeed, such a pressure of steam be applied as to cause a very dangerous strain on the flanges of the vessel.

A new method of applying heat, however, has been patented by Mr. J. A. Coffey, the pharmaceutical engineer, and is now introduced by Messrs. Doulton & Watts, for working stoneware pans and stills, by which any temperature ranging from 100° to 700° F. can be safely and easily obtained.

Mr. Coffey's principle is to cause heavy paraffin oil to circulate, first through a coil of pipes in a furnace, and then through the jackets of the pans. The oil is carefully selected for the purpose, from the heaviest of the petroleum or paraffin products. It moves by its own convection. Heated in a close coil of pipe by a coke fire, it rises into an air-tight tank, from which it passes, through pipes, to the jackets of the different vessels to be heated, returning, after it has done its work, to the lowest part of the furnace coil; a continuous circulation is thus maintained, similar to that which occurs in a hot-water apparatus for warming buildings. After leaving the tank, the oil passes through a pyrometer, by which its temperature is indicated, and, by means of dampers, &c., to the fire, this can be regulated to any required point. The heating medium is turned on or off the jackets by taps, in the same manner as steam; and, as the

rate of flow can be checked or augmented at will, the temperature is perfectly under the control of the operator.

In the model which has been fitted up at Messrs. Doulton & Watts' to illustrate the principle of this method of working, the pyrometer generally indicates from 600° to 700° F., while a saturated solution of chloride of calcium is maintained at the boiling point in a shallow stoneware pan. No smell of oil is perceptible in the room; and it is stated that the same oil may be used for years, without deterioration or causing any deposit in the pipes. As contrasted with steam heat, the inventor claims for his process a saving of 30 per cent. in fuel. It is obvious that the large amount of heat necessary to convert water at 212° F. into steam at 212° is hereby economized. The stoneware used in this process is manufactured expressly by Messrs. Doulton, to ensure its being quite impervious to the oil.

Other applications of this method of conveying heat are included in Mr. Coffey's patent; but its easy adaptation to heating stoneware will probably be of the most interest to chemists.—*Chem. News, June* 10, 1870.

MODE OF PREPARING THE CUTCH OF COMMERCE FROM THE ACACIA CATECHU.

By Claude Dumaine.

Of this tree there are two varieties,—a white and a red kind; but the cutch or catechu is almost always prepared from the red kind, the white being seldom cut down. Cutch, or catechu, is prepared thus: The tree is cut down to about 6 to 12 inches from the ground, and chopped into small pieces, the smaller branches and bark being rejected. The chopped wood is then taken to the place of manufacture, generally under trees in the open air, and placed over a brisk fire in mud jars, called *gharrahs,* filled with about two-thirds of water. This is allowed to boil down till, with the extracted matter, it forms a liquid of syrupy consistence. The contents of several jars are then poured into a larger jar and again placed over a brisk fire for a period of from two to four hours, and, when sufficiently boiled down, it is poured out over mats covered with ashes of cow dung and allowed to dry. The wood, when dry, is used for fuel.—*Journ. of Agr. and Hortic. Soc. of India, pt. iv, p.* 399, 1869, *from Pharm. Journ. July* 9, 1870.

EUCALYPTUS OIL.

The essential oil of eucalyptus now being introduced into use in perfumery by Mr. Rimmel, has lately been examined by Cloetz. He took the product of *Eucalyptus globulus*, originally a native of Tasmania, where it was discovered by Labillardière, in the year 1792. It has since been acclimatized on the shores of the Mediterranean. From 10 kilogrammes of fresh leaves of the plant, 275 grammes of the essential oil were obtained by distillation with water. In another experiment about double the quantity of oil was obtained. The oil is very fluid, almost devoid of color, and having a smell analogous to that of camphor. It begins to boil at 170° C., and rises in boiling point as the distillation proceeds, until above 200°. The more volatile liquid, after purification with caustic potash and with fused chloride of calcium, boils regularly at 175° C.; this is eucalyptol. Its specific gravity at 8° C. is 0·905; it deflects the ray of polarized light to the right; it does not freeze; its vapor, mixed with air, is fresh, agreeable when inhaled, and has been employed as a therapeutic agent; it is hardly soluble in water, but very soluble in alcohol; its alcoholic solution, when highly diluted, is said to afford a perfume equal to the rose. The composition of eucalyptol is represented by the formula $C_{12}H_{20}O$ (vapor density 6·22). By the action of anhydrous phosphoric acid upon it, a liquid hydrocarbon of the formula $C_{12}H_{18}$, and named eucalyptene, has been obtained. This liquid boils regularly at 165° C., and has a sp. gr. of 0·835 at 12° C. Its vapor density is 5·3. It is derived from eucalyptol by the loss of the elements of water. At the same time a polymer of eucalyptene is produced. This liquid boils at temperatures above 300° C. Decomposition of the substance at the high temperature required for the determination of its vapor density, prevented a determination of that important datum. The name eucalyptolene is proposed for it. The behaviour of eucalyptol towards hydrochloric acid gas is very interesting. Cooled to zero and then treated with a current of dry hydrochloric acid gas, it absorbs the gas abundantly and solidifies to form a mass of crystals. Very soon, however, these crystals undergo spontaneous

decomposition, and are resolved into an aqueous solution of hydrochloric acid and a hydrocarbon, boiling about 168° C., and apparently identical with eucalyptene. In chemical history, therefore, eucalyptol resembles camphor, of which it appears to be a homologue—two steps higher in the series.—*Pharm. Jour. London, July* 23, 1870, from *Repertoire de Pharmacie.*

ON CURCUMIN.

M. Iwanof Gajewsky, has investigated turmeric, and states that sulphide of carbon takes up from that drug an oil containing, besides oxygen, 80·2 per cent. of carbon and 10 per cent. of hydrogen. This oil boils at from 240°—260° C. The drug having been next treated with ether, yields to that solvent curcumin, as a yellow-colored crystalline body C_4H_4O, fusing at 172°; the drug contains, moreover, another pigment and an alkaloid.—*Chemical News*, Aug. 12, from *Berich. der Deuts. Chem. Gesell., Berlin.*

ACTION OF CHLORINE UPON ABSOLUTE ALCOHOL WHILE EXPOSED TO DIRECT SUNLIGHT.

By MM. Streit and Franz.

While engaged in making hydrate of chloral with absolute alcohol, direct sunlight accidently fell upon the apparatus, the temperature of the contents of which was 62°. The continued action of the sun's rays caused a series of sharp detonations, accompanied by very bright lightning-like flashes inside the apparatus; the fluid, previously quite clear, became black, a blackish powder was separated, and the temperature rose to 78°. The authors repeated the experiment with artificial light, and found that magnesium light, the light emitted by a mixture of sulphide of carbon and deutoxide of nitrogen while burning, electric light and the light emitted by the ignition of a mixture of chlorate of potassa and sulphur, when ignited produce the same effect. The products of the decomposition of the alcohol were not further investigated, but exhibited a most frightful stench and a deep reddish brown color.—*Chemical News, London, Feb. 25th,* 1870.

Varieties.

On the Preparation of Subacetate of Lead by the Cold Process. By M. Nerning. When this preparation is made with heat, the acetate of lead is liable to dissolve excess of oxide of lead, and insoluble basic acetate is thus produced, forming a white flocculent precipitate, which renders the liquid turbid. To obviate this inconvenience, M. Nerning proposes to operate as follows :—Put the water, litharge, and acetate of lead into a bottle, and let them stand, with frequent agitation, for twenty-four hours, then filter. The solution thus obtained answers all the purposes for which it is required in pharmacy, and, if kept in a well-stoppered bottle, it will remain clear even when kept for a long time.—*Pharm. Journ., July* 9, 1870, *from Journal de Pharmacie et de Chimie.**

The Riga Pine.—M. Keller, of Darmstadt, writing in 'Cosmos,' says, that what is known outside Russia as the Riga Pine, [yielding Riga Balsam] and which has been praised for its specially good qualities, is unknown by any distinctive appellation at Riga, and is, in fact, nothing more than the ordinary *Pinus sylvestris.*—*Pharm. Journ., July* 9, 1870, *from Athenæum.*

Convertion of Angelic into Valerianic Acid.—According to Jaffe, angelic acid is not converted into valerianic acid by means of hydriodic acid. According to Ascher, a temperature of 180° to 200° C. is needed for this transformation, which does not take place at low temperatures. By heating together angelic acid, red phosphorus, and hydriodic acid to 180° to 200° C., for the space of eight hours, a complete transformation into valerianic acid was effected. As our readers will know, angelic acid differs from valerianic acid by two equivalents of hydrogen, which, according to the foregoing account, it acquires from the hydriodic acid.—*Pharm. Journ., August* 6, 1870.

Hybridization of Cinchonæ.—At the March meeting of the Linnean Society an interesting paper, by Mr. Broughton, chemist to the Madras Government, was communicated by Mr. Howard. Mr. Broughton stated that in the Madras gardens young plants were growing which appeared to be hybrids between *C succirubra* and *C. officinalis.* In Java also something similar has occurred between *C. Calisaya* and *C. Pahudiana* (= *C. Hasskarliana*, nov. sp. Miq.). In a letter, Dr. de Vrij says :—" The *Ca-*

* The editor, in a note, states with reference to this process, that it has long been adopted in the military hospitals, the following being the proportions of ingredients used:—Crystallized acetate of lead three hundred parts; litharge, in fine powder, a hundred parts; distilled water, six hundred and fifty parts. Put them into a bottle, shake them from time to time, and at the expiration of six or eight hours, filter.

lisaya of Java contains, besides quinine and cinchonine, very often quinidine. The *C. Pahudiana* contains, besides quinine and cinchonine, almost always cinchonidine. In the hybrid of these two I found no quinidine, but cinchonidine and quinine. As the total amount of alkaloids was small, I was unable to ascertain the presence of cinchonine." (The Hague, 1870.) This discovery will doubtless prove of great importance, for by this means the more delicate, but valuable, alkaloid species can be crossed with those that are more hardy but less valuable, and thus valuable and hardy plants will be obtained.—*Pharm. Journ., Aug.* 6, 1870.

Tea culture in Tennessee.—The tea plant is in successful cultivation some ten miles from Knoxville, Tenn., where it has been raised for the past ten years. The plants were originally obtained through the Agricultural Department at Washington, in the year 1858.

The plant is an evergreen shrub, growing to the height of some five feet. It is perfectly hardy, and needs no protection from frosts. It bears an abundant crop, with beautiful, fragrant flowers, in October. The seed is not matured until the following season.

Captain James Campbell, who has made the experiment of raising the plant, has not attempted its cultivation on a large scale, but, as he expresses it, "just enough to keep the family in tea." Good judges, who have tried the Captain's tea, pronounce it to be not inferior in fragrance and flavor to the imported Young Hyson. It seems quite probable, then, that "Young America" may yet live to see Young Hyson thoroughly naturalized on Uncle Samuel's plantation.—*Nashville Journ. of Med. and Sur., Feb.*, 1870, *from Boston Journ. of Chem.*

Nitrite of Amyl.—Guthrie, who investigated the properties of the nitrite of amyl after the discovery of it by Balard, proposed it as a resuscitative in drowning, suffocation and protracted fainting. It would seem worthy of a trial in the threatened syncope from chloroform; since the inhalation of but a few drops is followed by marked acceleration of the heart and flushing of the face. The writer poured about eight drops upon a towel, and, as an experiment, snuffed it two or three times, when immediately the radial pulse became accelerated, the heart throbbed with much force, and the pulsation of the cranial vessels became almost painful. At the same time there was a decided tingling of the ears. The symptoms lasted but a few moments, the tingling remained after the circulation had become quiet.

This agent has been used successfully in England by Dr. Brunton and Dr. Anstie for the purpose of alleviating the spasm of angina pectoris.* It will probably now undergo the lot of each new therapeutic agent,† and pass the ordeal of hundreds of investigators. F. A. Burrall, M.D., *June* 8, 1870.—*New York Medical Gazette, June* 11, 1870.

*N. Y. Medical Gazette, April 2, 1870.

† It may be obtained from Mr. Spangenberg, 1165 Broadway.

Preparation of Pure White Gutta Percha.—This substance is now much used in dentistry and for other purposes, and as different qualities, some of them very inferior, are in the market, some of our professional readers may thank us for the details of a simple process for manufacturing it. Four ounces of the purest gutta percha that can be selected are to be digested for several days with five pounds of methyl-chloroform, until a solution is obtained thin enough to pass through filtering paper, care being taken during the operation to prevent any loss of the chloroform by using the apparatus constructed for that purpose. The solution is then to be filtered (an additional pound of chloroform will facilitate this), and should then be clear and nearly colorless. Alcohol is now to be added in sufficient quantity to precipitate the gutta percha in a voluminous white mass, which then is to be washed with alcohol, pressed in a cloth and dried in the air. It must finally be boiled in water in a porcelain vessel for half an hour, and while still hot rolled into sticks. The chloroform can be separated from the alcohol by adding water, and the alcohol recovered by distillation.—*Journ. of Applied Chemistry, July* 1870.

Cement for Knife Handles.—The best cement for this purpose consists of one pound of colophony (purchasable at the druggists) and eight ounces of sulphur, which are to be melted together, and either kept in bars or reduced to powder. One part of the powder is to be mixed with half a part of iron filings, fine sand or brick dust, and the cavity of the handle is then to be filled with this mixture. The stem of the knife or fork is then to be heated and inserted in the cavity, and when cold it will be found fixed to its place with great tenacity.—*Druggists' Circular.*

Black Varnish for Iron-work. Asphaltum, 48 lbs., fuse; add boiled oil, 10 gallons, red lead and litharge, of each 7 lbs.; dried and powdered white copperas, 3 lbs. Boil for two hours; then add dark gum amber (fused), 8 lbs.; hot linseed oil, 2 gallons; boil for two hours longer, or till a little of the mass, when cooled, may be rolled into pills; then withdraw the heat, and afterwards thin down with oil of turpentine, 30 gallons. Used for the iron-work of carriages and for other nice purposes.—*Drug. Cir. and Chem. Gaz., March*, 1870, *from Blinn's Workshop Companion.*

Experiments on the Production of Sulphuric Acid from Gypsum. H. Reinsch. A quintal (hundredweight) of gypsum, $CaO,SO_3 2HO$, contains about 57 lbs. of sulphuric acid (so-called English). The author, after referring to the very many hitherto unsuccessful attempts made to obtain this acid from this most abundantly-found mineral, states that, when he mixed two parts of pulverized gypsum with one part of carbonate of ammonia, and poured water over this mixture, complete decomposition of the gypsum ensues, sulphate of ammonia is formed, and carbonate of lime.

The sulphate of ammonia is, in its turn, decomposed by means of common salt, the result being the formation of sulphate of soda and chloride of ammonium, which can again be converted into carbonate of ammonia by means of chalk.—*Chem. News, July 8*, 1870.

Jewish Physicians in Rome. Although Roman history mentions a large number of celebrated Hebrew physicians, who attended former Popes in cases of severe sickness, and although Leo X's body physician was a Jew, the practice of medicine is at the present time allowed to Jews only on the condition that they confine themselves to members of their own religion. A Hebrew doctor, who, two years ago, attended to a Catholic who had fainted in the street, and visited him at his special request, at his home, escaped punishment only through the intercession of some influential persons. The practice of pharmacy in Rome is absolutely prohibited to Jews.—*Pharm. Zeitung.*

Female Students. The University of Zurich, Switzerland, has now 14 female students, 12 of whom have matriculated in the medical and 2 in the philosophical department. The rectorate of this university say, that the presence of females in the theoretical and practical courses has created no difficulty whatever. Lectures and demonstrations are given without regard to the presence of ladies, also the anatomical exercises and clinical exhibitions. With an experience of six years, the faculty look calmly forward to the solution of this question. The faculty are, however, of the opinion, that for the result thus far obtained, the determined love of labor and the genteel behaviour of the lady students, also the political status and the serenity of the Swiss students, is to be taken into account.—*Pharm. Zeitung*, Bunzlau, N. 43.

White Cinchona Bark from Payta. O. Hesse. The author found that this bark contains, beside paytin, so large a quantity of starch that the bark might be used as a fermentable and distillable alcohol-producing material. The paytin is a new alkaloid, readily soluble in alcohol, ether, benzine, and chloroform; difficultly soluble in water, in potassa solution, and ammonia; it fuses at 156°, combines with acids, forming salts and double salts. The formula of paytin is $C_{21}H_{24}N_2O$.—*Chem. News, Aug.* 12, 1870.

On Agoniada and Agonidine. Dr. P. Peckolt. The author has extracted from the agonia bark (*Plumeria lancifolia*), a tree indigenous to the Brazils, the bark being largely used in that country as febrifuge, a substance which he calls agonidine, a crystalline matter, devoid of smell, of a very bitter taste, difficultly soluble in ether, but more readily so in boiling alcohol and boiling water, does not sublime on being heated, is soluble, also, in solution of caustic potassa; in ammonia and in concen-

trated sulphuric acid, the latter solution is at first of a golden-yellow color, but turns gradually green. Upon the addition of nitric acid to the sulphuric acid solution of agonidine, a yellow-colored flocculent matter is separated; this substance is a glucoside identical with arbutine, and contains no nitrogen. The formula of agonidine is $C_{10}H_{14}O_6$.—*Chem News, Aug.* 12, 1870.

Editorial Department.

Meeting of the Association at Baltimore.—The following notice of the President was published in our August advertising sheet, and is reprinted here for record. Appended to it is the Notice of the Permanent Secretary, giving details useful to visitors.

Notice of the Annual Meeting.

The 18th Annual Meeting of the American Pharmaceutical Association will be held in the city of Baltimore on the second Tuesday (the 13th day) of September, 1870, commencing at 3 o'clock, P. M. The place of meeting and the arrangements for the accommodation of those who will be in attendance, will be announced by the Local Secretary. It is expected that the several standing and special committees will be prepared with full and highly instructive reports on the many important subjects which should engage our attention at this time. The central position of Baltimore will afford opportunity for many to be present at this meeting who have not usually met with us. A full attendance of the members is earnestly desired, as among the important business to be brought forward will be the revision of the Constitution, more particularly in reference to improving the financial status of the Association.

Pharmacists and druggists eligible to membership are earnestly invited to forward or present their names for election, and thereby aid in extending the usefulness of this Association. Those desiring to join can obtain the necessary blank applications from the Chairman of the Executive Committee, Mr. Thos S. Wiegand, 528 Arch St., or from the Permanent Secretary, Prof. John M. Maisch, 1607 Ridge Avenue, Philadelphia.

A cordial invitation is extended to all engaged in manufactures connected with pharmacy or with chemistry, to send specimens of their productions for exhibition during the session. These may be sent to Prof. J. Faris Moore, Local Secretary, Baltimore, accompanied with an invoice and a full description of the articles sent.

E. H. SARGENT, President.

Chicago, July 1, 1870.

The Eighteenth Annual Meeting of the American Pharmaceutical Association will be held on the second Tuesday, the 13th day of Sept., 1870, at 3 o'clk, P. M., in the building of the University of Maryland, on West Lombard Street, in the City of Baltimore. Ample accommodations have been secured in the same building for the exhibition of Drugs, Preparations, Apparatus, Models and Specimens interesting to and connected with the business of the Pharmacist. The central location of Baltimore, in connection with the important subjects to be reported and to be acted on, will render this meeting one of the most important ones.

The Fountain Hotel, located on Camden, near Howard St., has been selected as the Headquarters, and accommodations have been secured for members and their families at a reduced rate.

You are earnestly requested to be present at this meeting, and to extend the usefulness of the Association, by urging those of your friends who are eligible, to join in membership. Blanks for this purpose, with all the necessary information, will be promptly forwarded on application to the undersigned or any member of the Executive Committee.

You are likewise requested to send and cause to be sent, for exhibition, any Specimens of interest to the Profession. The Local Secretary, Professor J. Faris Moore, will take charge of all goods intended for exhibition during the meeting; or, they may be consigned to the care of Messrs. Sharp & Dohme, Cor. Howard and Pratt Sts. Goods intended for exhibition, ought to be forwarded free of charge, during the first week of September, and be accompanied with an invoice and a condensed description of the articles sent.

Very respectfully,
JOHN M. MAISCH,
Permanent Secretary, Amer. Pharm'l Assoc'n.
Philadelphia, August 5, 1870.

The Pharmaceutical Society of Great Britain.—The changes which have been going on in the policy of this Society since the Act of Parliament granting it the power to carry out that Law of Registration and Examination, have been marked with some features that deserve a notice. At the institution of that Society, or soon after, Parliament granted the privilege or right of using the name "pharmaceutical chemist" solely to its members, as a distinctive mark. Notwithstanding its numerous membership at the beginning (over 3000) it represented only a minority of the actual number of persons engaged in the dispensing of drugs. The educational measures instituted by the Society at London directly and indirectly through the influence of members in other parts of the country, aided largely by the wide distribution of the Pharmaceutical Journal, raised the status of the Society and gave it an influence which was used skilfully at times, when the subject of a sale of poisons law and other measures were before Parliament. Meanwhile the large body of "chemists and druggists" became affected by induction; many of them were able men, and a Journal advocating their interests was instituted. The idea of breaking down the barrier which lay between themselves and the pharmaceutical chemist was broached, and culminated in the suggestion of an Annual Meeting, where both branches could meet on common ground, and act in unison in the prosecution of scientific inquiries and professional improvements. The influence of these annual gatherings was most happy, as well on the Society as on the chemists and druggists; a better feeling was created, and when in 1868 the subject of the sale of poisons again agitated Parliament, the Society, greatly aided by its President, Mr. Sanford, urged a law requiring all who sold poisons to be registered, and all who dispensed medicines as pharmaceutists to be examined. Those passing the higher examination to be pharmaceutical

chemists and members of the Pharmaceutical Society, and those sustaining the minor examination to be "chemists and druggists." The confidence reposed in the Council of the Society by Parliament was certainly very flattering to that body, and was well deserved. But the object of this note is more particularly to call attention to the effect of these changes on the Society itself. Until recently the Council of the Society sat with closed doors, their action almost entirely centered in the London members, and they were able to do pretty much as they pleased in the management. Recently, however, the "country members" have come forward at the Annual meetings, and have made themselves felt; have broken down much of the exclusiveness that formerly obtained, by re-arranging the by-laws, and infusing a larger representation of their numbers into the Council. The meetings are also thrown open to reporters. The Annual Meeting in May last was marked by unusual agitation from the outspoken country members, and at the election which followed the constitution of the Council was modified. The votes of the members not present are given by proxy. Voting papers are used by all the members, and the votes are counted by a committee of scrutineers. On this occasion, one of these, named Dickinson (the same who formerly caused so much trouble to the Society in the days of Jacob Bell) so far forgot his duty as a man and a member as to resort to fraud in counting the votes, which resulted in the necessity of re-counting them in the presence of experts, when the fraud was determined. Mr. Dickinson subsequently acknowledged his guilt, exonerated all others, and gave as a reason his wish to test the flimsy and faulty method of voting, which, being made for honest men, had no provision against such treason as he manifested. The feeling created by this outrage has been almost universal against its author.

Officers of the Pharmaceutical Society for 1870–71.—At a meeting of the council held June 1st, 1870, George Webb Sanford, was elected *President*; Adolphus F. Haselden, *Vice President*; Thomas Hyde Hills, *Treasurer*; Elias Bremridge, *Secretary* and *Registrar*; and Richard Bremridge, *Assist. Secretary* and *Deputy Registrar*.

The Pharmaceutical Journal.—After the death of Jacob Bell a new series of this Journal was commenced, under the editorship of Profs. Redwood and Bentley aided by others, until the present year. Among the changes brought about by the country influence on the Council was one directed to the management of the Journal; the country members complained that they were not sufficiently represented, and urged a change. A committee appointed to consider the matter reported in favor of making the Journal weekly, and giving more space to subjects of general and scientific interest and less to strictly society matters. The Editorship having been made elective, the new Council advertised for candidates, and early in July an election was held, which resulted in

the election of Dr. B. H. Paul, who has taken charge of the work. The Journal is wholly changed in its character, its size is royal octavo, double column, twenty pages in a number, with an advertising sheet of twenty pages, and without a cover. As a vehicle for scientific information its style and capacity have much improved, as the discussion of the policy and special interests of the Society, which formerly occupied so much space, has been make subordinate. To Prof. Redwood it must be a great relief, but after his long and valuable services as principal Editor he should not have been thrown out in so abrupt a manner.

The Chemist and Druggist.—London.—The July number of this Journal informs that Mr. John C. Brough, its Editor, has been elected to the Librarianship of the London Institution, a position for which he is said to be well qualified. Mr. Brough will continue to contribute to the Chemist and Druggist. The offer of a prize for the best model for a dispensing counter is made in a recent issue. This subject has not attracted much attention in the United States, each proprietor having his own ideas of comfort and adaptation in the details,—some using the crudest arrangements, and others observing great ingenuity in saving labor and promoting the comfort and exactitude of the dispenser.

Dr. Frederick A. Flückiger, State Apothecary at Bern, so favorably known as a writer on pharmacognosy and organic analysis has recently received the appointment of the professorship of pharmacy and pharmacognosy in the University of Bern. The extraordinary ability and industry which Dr. F. can bring to bear in his new position will enable him to illustrate the chair greatly to the advantage of his pupils. Dr. F.'s cabinet of materia medica is very interesting, as well for its variety as from the fact that the specimens are accompanied in many instances with the principal constituents isolated by his own industry and researches, and it will greatly add to his means of illustration.

Alumni Association of the Philadelphia College of Pharmacy.—We have been requested to publish the following:

"The Executive Board of the Alumni Association are pleased to announce that a sufficient proportion of the Laboratory Fund has been collected to enable the College to establish the School for Practical Instruction during the coming winter. The Board would earnestly impress on those who have subscribed, the importance of handing in the amount of their subscriptions at the earliest moment.

Clemmons Parrish, *Secretary*.

"At a recent meeting of the Executive Board of the Alumni Association it was resolved, to offer a prize of a gold medal to the graduate of the Philadelphia College of Pharmacy who shall be deemed by the Board of Examiners the most proficient.

Clemmons Parrish,
Secretary."

The Association of the Alumni of the Massachusetts College of Pharmacy.—A letter from Thos. Doliber, Secretary of that Association, informs that J. R. Cheney, T. Doliber, J. C. Lowd, C. A. Tufts, and A. B. Warfield have been elected delegates to the American Pharmaceutical Association, to meet in Baltimore on the 13th of September next.

Louisville College of Pharmacy.—By the following extract from the Louisville Commercial of August 8th, it will be perceived that our Kentucky confreres are waking up to the necessity of helping themselves in the matter of education. The movement noticed below, though only for organization, is a proper preliminary to a school of pharmacy, and it is to be hoped that at an early date such a school will be opened.

"The necessity of a college of pharmacy in our midst has long been felt by the pharmaceutists of Louisville, but it is only within the last few months that steps have been taken to organize such an institution. It will be seen below that the druggists of Louisville and the cities of New Albany and Jeffersonville held a meeting in the lecture hall of the Louisville College of Medicine, at which this organization was effected, and to judge from the enthusiasm and unanimity of action manifested, the Louisville College of Pharmacy will be a success from its very inception.

"The objects of the college are the cultivation, improvement, and diffusion of the science and art of pharmacy by instituting and maintaining a school of pharmacy, and by the interchange of knowledge among its members and the profession in general. It is proposed to hold monthly pharmaceutic meetings, at which all matters of interest to pharmacy are brought up and discussed; and this will probably be the extent of usefulness of the college at present. By proper energy, however, it is hoped that a school may be opened at an early date, and to this end the members of the college have pledged their heartiest co-operation and support.

"Below is appended a communication from the recording secretary:

"'At a general meeting of the druggists of Louisville and vicinity, held in the lecture hall of the Louisville Medical College, on Tuesday, August 16th, at 2 o'clock P. M., an association called the Louisville College of Pharmacy was organized by the adoption of a constitution and an election of the following officers:

"'President—C. Lewis Diehl.

"'Vice Presidents—B. F. Scribner, of New Albany, and Geo. A. Newman.

"'Recording Secretary—Fred. C. Miller.

"'Corresponding Secretary—Louis Eichrodt.

"'Treasurer—Geo. F. Cary.

"'Curator—J. A. McAfee.

"'Trustees—Thos. E. Jenkins, S. F. Dawes, Dan. B. Grable, Ferd. J. Pfingst, and John Colgan.

"'A committee on by-laws and code of ethics, consisting of Messrs. Thos. E. Jenkins, Geo. T. Cary, and B. F. Scribner, was appointed and instructed to report to the board of trustees, who were empowered to accept the same, subject to the approval of the college at its next regular meeting.

"'Messrs. Geo. S. Newman, J. M. Krim, and Jas. E. Brown were appointed a committee to obtain a charter for the college as soon as practicable.

"'After the transaction of some minor businesss the college tendered

a vote of thanks to the dean and faculty of the Lousiville Medical College for their courtsy in proffering the use of their lecture hall. After which a motion to adjourn until the next general meeting was adopted.

"'FRED. C. MILLER, Recording Secretary.'

"The board of trustees have called a meeting for next Tuesday, Aug. 23d, at 3 o'clock P. M. The time for the pharmaceutic meetings will be announced at an early date.

UNIVERSITY OF GŒTTINGEN.—The chair of chemistry at this institution, vacated by the transfer of Prof. Fittig to the University of Tübingen, has been filled by Dr. Hans Hübner as extraordinary professor in the philosophical faculty.

UNIVERSITY OF PENNSYLVANIA.—In justice to the fair fame and the well merited renown of the University of Pennsylvania, the oldest institution of the kind in this country, our European exchanges are requested to contradict the report that the medical faculty thereof are granting diplomas to any one on the payment of forty to fifty dollars. This assertion of a N. Y. Journal some months ago, was at once corrected in the United States; but Prof. Maisch informs us it found its way into the usually well informed *Pharm. Zeitung* of Bunzlau, and on its authority is going the round through the scientific journals of Europe. The above charges refer to another institution, bearing a similar name, and also located in Philadelphia, but without standing in the medical profession; while the medical faculty of the University of Pennsylvania are honestly endeavoring to sustain the reputation which has been established by the earnest and conscientious labors of some of the most celebrated physicians of America during a period of one hundred years.

THE ROYAL RHENISH-WESTPHALIAN POLYTECHNIC SCHOOL AT AIX-LA-CHAPELLE.—The Prussian government, in carrying out its intentions of increasing the means of scientific and artistic education, intends opening, on the 10th of October at Aix-la-Chapelle, an extensive polytechnic high school of the same kind as those at Hanover and Berlin, and a combination of the aims and scope of the "Ecole Polytechnique," "Ecole des Mines" and the "Ecole Central des Arts et Manufactures" at Paris. The *Chemical News*, in speaking of this Institution, says: "The main subjects of ordinary instruction are fifty-eight in number, and besides these thirteen extraordinary subjects will be given; in fact, as might be expected from the Prussian government, the establishment is in every respect complete. The building is an imposing and beautiful one, of large dimensions, fitted up with all the requisites for this purpose. It has been erected in a city, the best which could be selected in Rhenish Prussia, since it is readily accessible, its situation healthy, and what is of more importance it is eminently the centre of a large manufacturing, mining, and technically highly developed district, and at an easy distance as well from the Rhine as from Belgium and France. The fees are exceedingly moderate, and

the appointed teachers are men of experience as well as of high scientific standing." These schools open a most valuable opportunity for earnest young American minds who are able to qualify themselves as missionary teachers of science and art in this country by a thorough course of study abroad, and it is greatly to be hoped that such will be encouraged to go abroad and fit themselves to serve their country in this most efficient and praiseworthy manner.

A PHARMACEUTICAL INSTITUTE is to be connected with the University of Marburg, Germany; the plans for the building have already been approved.

CO-OPERATIVE TRADING, APPLIED TO MEDICINE AND PHARMACY.—For sometime past a system of joint stock trading has been carried on in London, with a view to the supply of food, clothing and other necessaries of life to the classes in moderate circumstances who contribute. The bearing of this system on regular trading has been discussed in several letters and articles contained in the Pharmaceutical Journal for 1869-70, and although the question has arisen as to whether such trading pays in the long run, it is quite certain that it interferes with the legitimate channels of trade. The editor of the Pharmaceutical Journal calls attention to a new form of this co-operation called the "Metropolitan Mutual Medical Aid Society," designed to supply medical and surgical aid, and medicines to the subscribers. The society is only intended for persons of very moderate income, and does not include attendance in accouchments or incurable cases.

The editor remarks, as many of the contributors to co-operative stores are medical men, they cannot complain if the tables are reversed.

ILLUSTRATIONS OF THE GENUS CINCHONA BY DR. MUTIS.—We learn from the Pharm. Journ. of Aug. 13, that the drawings executed under the direction of the celebrated Dr. Mutis at the end of the eighteenth century, and which were discovered by Mr. Clements R. Markham in an outhouse in the botanical garden at Madrid with some of the MSS. of that writer, are about to be republished.

BETTS' METALLIC CAPSULES.—The suits in Chancery which have been pending about five years, commenced by a Mr. Betts, agent or proprietor of the capsules of metal, originating in a French patent for capping bottles, have recently been brought to a termination favorable to the defendants (druggists and others) before Vice Chancellor James. There were twenty-five separate bills against retailers of capsuled articles, and Mr. Betts sought injunctions, damages and costs. When the testimony was given in it appeared that the suits were commenced on a very slim basis, viz., a single capsuled bottle for each, which Betts stated were of

"foreign manufacture." On cross-examination it was made to appear that the very capsules on which the suits were brought were made by the Paris house of the prosecutor (!) and that he was acting in a double capacity. The suits were all dismissed with costs and the plaintiff condemned in strong terms by the Vice Chancellor.

The Eighth Edition of the American Dispensatory (Eclectic).—We have received a circular from Messrs. Wilstach, Baldwin & Co., of Cincinnati, stating that they are about to publish a new and extended edition of Dr. John King's work on Materia Medica, "The American Dispensatory, which has been "completely revised and largely re-written," in one royal octavo volume of 1440 pages—price, $10. From the long delay which has occurred it is probable that Dr. King has made many changes and additions.

Archives of Ophthalmology and Otology. Edited and published simultaneously in English and German, by Prof. H. Knapp, M.D., in New York, and Prof. S. Moos, M.D., in Heidelberg. Vol. I, No. 2. New York: William Wood & Co. Carlsruhe; Chr. Fr. Muller'sche Hofbuch-handlung, 1870. pp. 357.

This most elegantly gotten up of the medical serials makes its appearance in No. 2, thus completing the volume of 723 pages with eleven plates besides numerous wood cuts, and embraces twenty-four articles, fourteen of which are written here and ten in Germany, and translated here for this work. The growing importance of the specialities of which it treats renders the "Archives" a valuable addition to the medical library of the practising physician. The price of the work is $7.00 per annum.

The American Chemist: a monthly journal of theoretical, analytical and technical chemistry. Edited by Charles F. Chandler, Ph.D., and W. H. Chandler. Published monthly in numbers of forty pages each, royal octavo, by William Baldwin & Co., 434 Broome st, New York. July 1st, 1870.

Many of our readers are aware that a reprint of the Chemical News, a weekly journal of London, edited by William Crookes, F.R.S., has been republished during the past three years in monthly numbers under the same name with a supplement of American origin. The proprietors of the American Chemist having purchased the stock and other interest of the reprint of the Chemical News, "have decided to advance the interests of American chemical science, by the publication of a journal which shall be a medium of communication for all practical, thinking, experimenting and manufacturing scientific men throughout the country," and have placed it in the editorial charge of Prof. C. F. Chandler and W. H. Chandler of the School of Mines, New York. This change is highly important, first because the reprint of the Chemical News did not fairly

represent that work, the matter being arranged differently; but chiefly because it gives us an American journal in capable hands entirely devoted to chemical science. During the current year the editors will extract largely from the Chemical News as a duty to the transferred subscribers, after which the American Chemist will be entirely independent. The enterprise has our best wishes for its success.

The Half-yearly Abstract of the Medical Sciences, being a digest of British and Continental medicine and the collateral sciences. Edited by William Dormett Stone, M.D. Vol. LI. July, 1870. Philada.: Henry C. Lea; pp. 296 octavo. $2.50 a year in advance. Single numbers, $1.50.

Braithwaite's Retrospect of Practical Medicine and Surgery. Part LXI. July, uniform American edition. New York: W. A. Townsend and Adams publishers, 1870. $2.50 a year, in advance; or $1.50 per single part.

Half-Yearly Compendium of Medical Science; a synopsis of American and Foreign literature of medicine, surgery and the collateral sciences, for six months. Edited by S. W. Butler, M.D., D. G. Brinton, M.D., and G. H. Napheys, M.D. Part VI. July, 1870. Philada.: S. W. Butler, M.D., 115 South 7th St. $3.00 a year, in advance; $2.00 for single numbers.

These semi-annuals all contain a great variety of valuable papers from the journals of Europe and the United States, relating mainly to medicine and surgery. The two first are reprints, the last an original compilation of the same character. They are too well known in medical circles to need even this explanation. They are all sent *post paid* for the subscription price.

Twenty-seventh Annual Report of the Managers of the State Lunatic Asylum for the year 1869. Albany, 1870: pp. 92, octavo.

The Proof Sheet; a bi-monthly typographical magazine issued by Collins & McLeester, type founders, Philada. Pp. 20, royal octavo.

The Proof Sheet is a happy way of showing neat printing from beautiful type on superb paper, and to those connected with the press or who have to do with selecting type for labels this bi-monthly will prove a useful visitant. Price $1 per annum.

Artificial Refrigerators.—Carré's and Mignon and Rouat's continuous freezing apparatus, for the production of ice by the direct action of heat. Philada., 1870. By M. J. Bujac of New York, 17 Broad St.

This is a pamphlet of seventeen pages with three illustrations, intended to explain M. Carré's apparatus described in this journal in March last.

Much attention has recently been given by Mr. Bujac to the reduction of the temperature of apartments for brewers and others requiring a modified and regular heat. Those desirous of information on the subject would do well to get the pamphlet as above.

OBITUARY.

Sir James Clark, Bart., M.D., F.R.S., died at Bagshot Park, Surrey, on the 29th of June. He was born in 1788, educated at King's College, Aberdeen, completed his medical studies at Edinburgh University, passed some years as Surgeon in the Navy, settled at Rome in 1820, returned to London in 1826, became physician to the Duchess of Kent and Princess Victoria, and was knighted by the latter after her accession to the throne. Sir James took a lively interest in the proceedings of the Pharmaceutical Society at the time of its establishment and afterwards.

Albrecht Von Graefe—This celebrated physician and oculist, whose recent death is announced in the journals, was born in Berlin in 1825, and was the son of an eminent surgeon. After finishing his academic studies, he spent some time in England in company with Prof. Donders, of Holland, and returning to Berlin established the Ophthalmic Hospital now so celebrated. In 1853, in connection with Arlt and Donders, he founded the *Archiv. für Opthalmologie*, to which he continued to his death an active contributor. His great discovery was that glaucoma, or disorganization of the eye-ball, could be arrested by iridectomy. "The Lancet" says of him: "There can hardly be, either in Europe or America, a community of 10,000 persons which does not contain at least one individual who is in the enjoyment of vision that has been preserved by iridectomy, and who if Von Graefe had not lived would now be unable to see the sun." As a physician he owed much of his success to a combination of suavity and firmness of manner, and, like Simpson, was followed to the grave with profound regret by a wide circle of friends and patients.

M. Sembenini, of Verona, Italy, died recently, aged sixty-five years. He took much interest in the literature of Italian Pharmacy, and was the translator of the "Codex Francaise," the *Traité de Pharmacie* of Soubeiran, and other works.

M. Leroux, pharmacien of Vitry-le-Francais, was buried on the 22d of May, 1870, at the age of 65 years. He was the discoverer of salicin.

James Copland, M.D., F.R.S., of London, eminent as a medical writer and practitioner, died on the 12th of July, at Kilburn, in his 79th year.